UTSA
Office of Facilities

# DESIGN & CONSTRUCTION STANDARDS

*Consisting of*

## DESIGN GUIDELINES *and* GUIDELINE SPECIFICATIONS

*For*

## ARCHITECTURAL SERVICES

FOURTEENTH EDITION (2nd ISSUE) • APRIL 2014

*UTSA Design & Construction Standards*

# Table of Contents


Tables & Graphics 7

Preface 8

Use of the Standards 9

The Standards, *organized by Master Format Division*

01 **General Requirements** 10
- *1 Summary of Work*
- *2 Construction Code Compliance*
- *3 UTSA Master Plan Compliance*
- *4 Work Restrictions*
- *5 Project Administration*
- *6 Quality Control*
- *7 Construction at Existing Facilities*
- *8 Temporary Facilities & Controls*
- *9 Product Requirements*
- *10 Project Close-Out*
- *11 Project Commissioning*
- *12 Coordination of Standards*

02 **Existing Conditions** 30
- *1 Basic Sitework Requirements*
- *2 Selective Demolition*

03 **Concrete** 34
- *1 Concrete Reinforcement*
- *2 Cast-In-Place Concrete*
- *3 Special Concrete Finishes*
- *4 Mud Slab*

04 **Masonry** 36
- *1 Unit Masonry*
- *2 Stonework*

05 **Metals** 40
- *1 Structural Steel*
- *2 Open Web Steel Joists*
- *3 Metal Decking*
- *4 Cold-Formed Metal Framing*
- *5 Metal Fabrications*

06 **Wood, Plastics & Composites** 44
*1 Rough Carpentry*
*2 Custom Casework*
*3 Solid Polymer Fabrications (Solid Surfacing Material)*

07 **Thermal & Moisture Protection** 47
*1 Bituminous Waterproofing*
*2 Building Insulation*
*3 Firestopping*
*4 Roofing Tiles*
*5 Manufactured Roof Panels*
*6 Flat or Low-Slope Roofing – General*
*7 Built-Up Asphalt Roofing – Historical Information*
*8 Single-Ply Membrane Roofing*
*9 Sheet Metal Flashing & Trim*

08 **Openings** 51
*1 General*
*2 Steel Doors*
*3 Steel Door Frames*
*4 Flush Wood Doors*
*5 Access Doors*
*6 Sectional Overhead Doors*
*7 Aluminum Entrances & Storefronts*
*8 Door Hardware*
*9 Glazing*
*10 Windows*

09 **Finishes** 58
*1 General*
*2 Unfinished Areas*
*3 Portland Cement Plaster*
*4 Hard Floor Surfaces*
*5 Resilient Tile Flooring*
*6 Carpet*
*7 Painting*

10 **Specialties** 61
*1 Toilet Compartments*
*2 Bulletin Boards, Marker Boards & Map Rails*
*3 Signs*
*4 Fire Extinguishers, Cabinets & Accessories*
*5 Telephone Specialties*
*6 Hearing Assistance Notification System*
*7 Toilet & Bath Accessories*
*8 Defibrillators & Cabinets*

11 **Equipment** 67
*1 Window Washing Equipment*
*2 Projection Screnns*
*3 Audio Video Systems*

*4 Laboratory Casework & Equipment*
*5 Copy Machines – Pay-for-Use*
*6 Vending Machines*
*7 UTSA Cable Television Cabinet*
*8 Student Computer Kiosks*
*9 Value Stations*
*11 Laundry Controller*

12 **Furnishings** 73
*1 Laboratory Casework & Fixtures*
*2 Horizontal Louver Blinds*
*3 Floor Mats & Frames*
*4 Black Out Shades & Laser Curtains*

13 **Special Construction** 74
*1 Environmental Rooms*
*2 Roof Tie-Off Points*

14 **Conveying Equipment** 76
*1 Elevators*

*15 – 20 [Reserved]*

21 **Fire Suppression** 78
*1 General*
*2 Fire Sprinkler Systems*

22 **Plumbing Standards** 80
*1 Plumbing Piping*
*2 Plumbing Fixtures*

23 **Heating, Ventilating & Air Conditioning** 86
*1 Overview*
*2 Design Conditions*
*3 General*
*4 Equipment*
*5 Variable Speed Drives*
*6 Ductwork*
*7 Hydronic Piping*
*8 Refrigeration Piping*
*9 Valves*
*10 HVAC Load Calculations for Energy Models*
*11 Building Chilled & Heating Hot Water Hook-Up Schematic*
*12 Heat Exchanger & Building Steam Hook-Up Schematic*
*13 Life Cycle Cost Analysis Guideline*

*24 [Reserved]*

25 **Integrated Automation** 105
*1 HVAC Control System (Building Automation System)*

26 **Electrical** 106
*1 Basic Electrical Requirements*
*2 Raceways*
*3 Electrical Identification*
*4 Grounding*
*5 Panelboards*
*6 Metal Clad Switchgear*
*7 Oil-Filled Transformers*
*8 High-Voltage Equipment (13,800V +)*
*9 Cables & Terminations (Medium Voltage)*
*10 Lighting Fixtures*
*11 Lightning Protection Systems*
*12 Surge Protection Device*
*13 Wiremold*

27 **Communications** 122
*1 Structured Cabling System*
*2 Clock Systems*

28 **Electronic Safety & Security** 129
*1 Security Systems*
*2 Fire Alarm Systems*
*3 Facility Control & Management Systems (FCMS)*

*29 – 30 [Reserved]*

31 **Earthwork** 134
*1 Site Clearing*
*2 Earthwork*
*3 Lime Soil Stabilization*

32 **Exterior Improvements** 136
*1 Hot-Mix Asphalt Paving*
*2 Portand Cement Concrete Paving*
*3 Pavement Sealer, Repairs & Re-Striping*
*4 Fire Apparatus Access Roads*
*5 Unit Pavers*
*6 Irrigation Systems*
*7 Landscaping*
*8 Site Furnishings*

33 **Utilities** 150
*1 Utility Materials*
*2 Water Distribution*
*3 Natural Gas System*
*4 Fire Protection Water Distribution*
*5 Sanitary Sewer & Storm Drainage*
*6 Site Utilities General Practices*

*34 – 49 [Reserved]*

Appendix **A** *Raceway Rough-In Detail* 155

Appendix **B** *Building Signage* 156

Appendix **C** *OIT Standards Graphics* 186

Appendix **D** *UTSAPD Security System* 193

Appendix **E** *Commonly Overlooked Standards* 247

Appendix **F** *Helpful Design Questions* 249

*UTSA Design & Construction Standards*

# Tables & Graphics


**Table:** Typical Proprietary Specification Items 24

**Table:** Audio Video Systems per Room Type 67

**Table:** Plumbing Piping Painting 88

**Table:** Refrigeration System Design Pressure 94

**Tables:** HVAC Load Calculations for Energy Models 95-97
- *Classroom Building*
- *Dormitories*
- *Laboratories*
- *Admin/Office Buildings*

**Graphic:** Building Chilled & Heating Hot Water Hook-Up 98

**Graphic:** Heat Exchanger & Building Steam Hook-Up 98

**Tables:** Electrical Color Coding 111-112
- *Conductors*
- *Low Voltage*
- *Medium Voltage*
- *Enclosures*

**Table:** Surge Voltage Protection Ratings 120

**Table:** Approved IT Products for Systimax Warranty 125

**Graphic:** Typical Direct Buried Pipe Trench Section 152

**Graphic:** Raceway Rough-In Detail 155

**Table:** Interior Signage Standard Style per Campus Building 161

**Graphics:** Building Signage Standard Designs 165-185

**Graphics:** OIT Standards 186-192

# Preface

The **UTSA Design & Construction Standards** presented herein are intended to assist architects, engineers, other design professionals, contractors and UTSA staff in understanding the preferences of the University of Texas at San Antonio in the development, maintenance and repair of its facilities. These standards are to be used as **guideline** specifications not a final set of specifications: therefore, the legal responsibility for project documentation preparation shall continue to reside with the Design Professional.

Not all standards apply to every job, but where applicable, the Design Professional should follow the standard, unless UTSA Facilities Engineering and Project Management (E&PM) grant prior approval. This document is intended to complement and be used in conjunction with the following documents:

- **Building Program**
  *published by the Programming Consultant*
- **Owner's Design Guidelines**
  *published by the University of Texas System, OFPC*
- **Master Plan for UTSA**
  *published by UTSA - Facilities*

This document is to be referenced as building projects enter the design phase of the project. This is a living document. Changes from the previous publication date are highlighted as follows: all additions to the document will be underlined, all deletions to the document will be ~~stricken through~~. With each new publication, all prior publication highlighting will be deleted. Updates to these Standards from previously released formal interim changes will not be highlighted.

Should there be a conflict between any of the items in this document and any other guideline, instruction, or governing code issued/referenced by the Owner, the more stringent shall apply.

This document is used for both new and renovation projects on UTSA campuses. Where appropriate, each is noted.

The **UTSA Design & Construction Standards** are organized in conformance with the Master Format Specification Standard as instituted by the Construction Specifications Institute in 2004. This CSI Standard is used by the vast majority of Design Professionals.

*UTSA Design & Construction Standards*

# Use of the Standards

## PURPOSE

The purpose of the **UTSA Design & Construction Standards** is to provide one source of documentation for all of those items of critical importance to UTSA in the design and construction of new or renovated facilities. As Standards, they are intended as a resource for the design professional to incorporate into his plans and specifications. They ARE NOT intended to be used as construction documents.

## CHANGES

Proposed changes to the **UTSA Design & Construction Standards** are sub-mitted by UTSA Project Managers, Shop Leaders or other personnel directly involved in construction projects. These changes are generally a result of problems encountered on current projects, or to correct deficiencies. These changes are sent to the Assistant Director for Capital Projects Group, preferably by email. The Assistant Director is responsible for ensuring that the information is appropriate, clear, concise, and acceptable to the Director of Engineering and Project Management. A key factor in acceptance is what effect the proposed change will have on the delivery of new facilities to UTSA. Acceptance is uncomplicated if the proposed change will improve the facility or improve maintenance and operations without having a significant change to the project cost. Acceptance is complicated if the proposed change will not improve the facility or if it has a significant change to the project cost. As of December 2007, the Assistant Director for Capital Projects Group has delegated the responsibility of reviewing changes, updating and maintaining the **UTSA Design & Construction Standards** to the Sr. Project Mgr. for Capital Projects.

## PUBLICATION

The **UTSA Design & Construction Standards** will be made available on the Office of Facilities website. Updates are scheduled to occur at least bi-annually and the updated Standards will be formally uploaded on the website.

## USE

UTSA Project Coordinators should make the **UTSA Design & Construction Standards** available to design consultants in the early stages of design. Whenever applicable proposed changes have been accepted, they should also be made available to the design consultant. If the **UTSA Design & Construction Standards** are updated and the design is still in progress on your project, you should again provide the design consultant with the updated documents.

## DESIGNER RESPONSIBILITY

UTSA Project Managers should endeavor to confirm that the design consultant has indeed incorporated the appropriate **UTSA Design & Construction Standards** information into the project drawings and specifications. Periodic review of the design at appropriate levels of completion is the best method. If discovered during any stage of the design or after a project has started construction, the design consultant is responsible to prepare and issue changes to the project, at no additional cost to UTSA, for any items that have been overlooked.

*Division 01*

# General Requirements

## 1. Summary of Work

A. Special items of work that shall be included in all new buildings are as follows:

1. **Security System:** The security system for the project is to be turnkey, including all conduit, wire, devices, and testing.
2. **Telephone/Data System:** To include all conduit, cable, receptacles, plates, termination, and testing. Devices are by the Owner.
3. **Audio/Visual System:** To include all conduit and cable needed for power, data and A/V systems. To include projection screens. Equipment is by the Owner.
4. **FCMS System:** To include all conduit, cable and devices.
5. **Clock System:** To include all conduits, cable, and devices tied into UT Master System in a location as determined by the Owner.
6. **Fire Alarm System:** To include all conduits, cable, and devices tied into Simplex Graphic Command Center/Campus Fire Alarm Monitoring System.

## 2. Construction Code Compliance

A. **General**

1. Every building owned or leased by UTSA is required to be designed and maintained in compliance with currently applicable construction codes.
2. The Project Architect/Engineer shall prepare a written codes and standards analysis, "Building Codes Analysis", for each project for review by UTSA. This analysis shall provide a side-by-side comparison of the requirements of the below listed codes and standards for each code issue and an indication of which code requirement is being applied to the project. In the absence of a careful and thorough discussion by the design team of a specific conflict between the codes, the default is to design to the more restrictive or more protective code. These code discussions are project-specific and on a point-by-point basis within the codes. The final approved Building Code Analysis shall be placed in the project construction document drawings for future reference by UTSA.
3. UTSA also requires the Project Architect/Engineer to comply with certain provisions of the local fire department that provides fire protection services for the institution. The provisions include locations and dimensions for fire-fighting access, including fire lanes; locations and specifications for stand pipes, fire hose cabinets, fire control room, and fire hose connections; elevator requirements; and other similar matters.
4. Codes and standards currently followed by UT System OFPC (Office of Facilities Planning & Construction) are the same as those followed

at UTSA, and are as follows:

a. Architectural Design
   i. International Building Code (2012)
   ii. TDLR Texas Accessibility Standards (2012)
   iii. Elevators & Escalators, Health & Safety Code Chapter 754 and 16TAC§74
   iv. Boilers, Health & Safety Code Chapter 755 and 16TAC§65
   v. Americans with Disabilities Act Standards (2010)

b. Civil/Structural Design
   i. ACI – 318 current edition, Building Code Requirements for Reinforced Concrete
   ii. AISC current edition, for Design, Fabrication and Erection of Structural Steel
   iii. Texas Department of Insurance Windstorm Inspection Program
   iv. FEMA 100-year flood plain

c. Mechanical & Plumbing Design
   i. International Mechanical Code (2012)
   ii. International Plumbing Code (2012)
   iii. International Fuel Gas Code (2012)
   iv. OFPC Guideline Specifications for Division 1-33 (where more stringent than the UTSA Standards)

d. Electrical Design
   i. National Electrical Code (2011)
   ii. OFPC Guideline Specifications for Division 1-33 (where more stringent than the UTSA Standards)

e. Energy & Water Conservation Design
   i. Energy Conservation Design Standard for New State Buildings (including major renovation projects), current edition, State Comptroller's Office, Government Code sec. 447.004 and 34 TAC §19.32
   ii. ASHRAE/IESNA 90.1 (2010)
   iii. International Energy Conservation Code (IECC)(2009)
   iv. SECO's Water Efficiency Standards for State Buildings and Institutions of Higher Education Facilities (1/2011)

f. Acoustical Design
   i. Noise Criteria as defined in ASHRAE Applications Volume, Chapter 42 and ANSI S1.8 Reference Quantities for Acoustical Levels – ASA 84
   ii. Teaching space as per ANSI S12.60, Classroom Acoustics Standard.

g. In addition to the above codes, UTSA follows the below referenced codes/standards. Design professionals and contractors are to be aware of the below, which are enforced by respective UTSA departments, including Facilities E&PM:
   i. **Office of Information Technology (OIT)**
      - BICSI Standards
      - Systimax Certification Standards
      - Electronic Industries Association and the Electronics Industries Alliance Standards

(TIA/EIA)

ii. **Security (UTSAPD/Access Control)**

- NFPA Guide, Codes 730 & 731 (current edition)

iii. **Safety (EHS&RM)**

- NFPA 101 (2012)
- NFPA 1 (2012)
- NFPA 70 – NEC (2011)
- NFPA 72 – National Fire Alarm & Signaling Code (2010)
- NFPA 10(2010), 13/13R (2010), 14(2010), 17/17A(2009), 25(2011), 30(2012), 31(2011), 45(2011), 54(2012), 58(2011), 80(2010), 88A(2011), 90A/B(2012), 91(2010), 92(2012), 96(2011), 2001(2012)
- International Fire Code(2012), as adapted by the City of San Antonio, for the purposes of tactical firefighting only.
- ANSI/AIHA Z9.2-2006 *Fundamentals Governing the Design and Operation of local Exhaust Ventilation Systems*
- ANSI/AIHA Z9.3-2007 *Spray Finishing Operations: Safety Code for Design, Construction, and Ventilation*
- ANSI/AIHA Z9.5-2003 *Laboratory Ventilation*
- ANSI/AIHA Z9.7-2007 *Recirculation of Air from Industrial Process Exhaust Systems*
- ANSI/AIHA Z9.10-2007 *Fundamentals Governing the Design and Operation of Dilution Ventilation Systems in Industrial Occupancies*
- ANSI/AIHA Z9.11-2008 *Laboratory Decommissioning*
- ANSI/ASHRAE 55-2004 *Thermal Environ-mental Conditions for Human Occupancy*

B. **Applicable Codes**

1. **Texas Commission on Environmental Quality (TCEQ)**

a. The Texas Pollutant Discharge Elimination System (TPDES) program implements the federal National Pollutant Discharge Elimination System (NPDES) program in the state of Texas.

i. TCEQ will use its TPDES storm water permits for Phase I construction activity.

ii. TCEQ has developed its Phase II general permit for construction activity disturbing at least 1 acre and less than 5 acres.

iii. Construction activity that is part of a larger common plan of development (where the larger development is greater than 1 acre), must seek coverage under a construction storm water permit. The larger common plan of development is defined as "a contiguous area where multiple separate and distinct construction

activities are occurring under one plan". The "plan" is defined as any announcement or piece of documentation or physical demarcation indicating construction activities may occur on a specific plot. All projects at UTSA campuses would fall into the "larger common plan of development".

b. UTSA Facilities' Environmental Manager is the controller of campus' TCEQ documents. This individual will coordinate with design firms on activities impacting these documents and TCEQ code compliance.

2. **State Energy Code (AHRAE 90.1/2001)** - Energy Design Standard for State Buildings and Facilities

a. Is applicable for all new projects.
   i. Statutory Reference: Texas Government Code, 447.004
   ii. Rule Cite: Texas Administrative Code Title 34, Part 1 Chapter 19, Subchapter C, Rule 19.31-19.34.

b. Standards:
   i. For non-residential state buildings and facilities, the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) / Illuminating Engineering Society of North America (IESNA), Energy Standard for Buildings Except Low-Rise Residential Buildings, ASHRAE/IESNA 90.1- 2001, or the most current adopted version.
   ii. For public low rise residential building, the energy conservation design standard of the international Energy Code Council as published in the International Energy Conservation Code for 2000, or the most current adopted version.

c. 19.33 of the code, "Major Renovation Projects"
   i. For the purposes of 34 TAC, Chapter 19, Subchapter C, a major renovation project is a building renovation or improvement that affects the energy or water use of the facility.
      - For example, a lighting project that requires engineering drawings would require certification, replacing lamps would not.

d. 19.34 of the code, "Submission of Certification and Compliance Documentation"
   i. Before beginning construction of a new state building or a major renovation project, a state agency or an institution of higher education shall submit to the State Energy Conservation Office (SECO) a copy of the certification by the design architect or engineer that verifies to the agency or institution that the construction or renovation complies with the standards that are established under this chapter, including engineering documentation.
   ii. For UT System managed projects, a draft of the energy compliance documentation should be sent to OFPC engineers for review at the DD phase. The final

compliance documentation should be sent to OFPC engineers for approval before being sent to SECO. The documents must be signed and sealed by the Mechanical and Electrical Engineer(s) of Record,

3. **Federal Oil Pollution Act (OPA)**
   a. All facilities must be designed in compliance with the Oil Pollution Prevention regulation Title 40, Code of Federal Regulations, Part 112 (40 CFR 112), as amended and effective February 17, 2006.
   b. For all oil storage containers with a capacity of 55 gallons or greater, the design shall provide necessary elements required to prevent the discharge oil from non-transportation-related onshore and offshore facilities into or upon the navigable waters of the United States or adjoining shorelines.
   c. Where appropriate, secondary containment shall be provided as part of the design. Methods of secondary containment shall include a combination of structure and drainage systems.
   d. Basic design criteria to be followed include the following:
      i. Oil-filled storage drums inside building – not required if located in a room with a floor sloped to drain connected to sanitary sewer. Where required, provide curbed area to contain 150% of drum capacity.
      ii. Oil-filled storage drums outside building – curbed area to contain 150% of drum capacity and protective roof covering.
      iii. Oil-filled electrical transformers inside building – no containment required if located in a room with a floor sloped to drain connected to sanitary sewer. Where required provide curbed area to contain 150% of drum capacity.
      iv. Oil-filled electrical transformers outside building – no containment required if greater than 100-feet slope toward a storm drain inlet or 500-year flood plain line. Where required, provide gravel filled concrete box with bentonite waterproofing.
      v. Hydraulic elevator reservoirs – provide pit with floor sloped to drain connected to sanitary sewer. Provide sump pump if below sewer line.
      vi. Other oil-filled operating equipment - no containment required if located in a room with a floor sloped to drain connected to sanitary sewer. Where required provide curbed area to contain 150% of drum capacity.
   e. As required by OPA, a Spill Prevention Control and Countermeasure Plan (SPCCP) document is maintained by the UTSA-Office of Environmental Health, Safety and Risk Management. The design consultant shall provide sufficient relevant information to UTSA to update the SPCCP at the conclusion of the design phase of the project. Information shall include:
      i. Item (Oil-filled electrical transformer)
      ii. Identification Number (T56)

iii. Location (On site at northeast corner of building)
iv. Capacity in Gallons (150)
v. Direction of Flow (Southwest to Storm Drain)
vi. Secondary Containment (gravel filled box lined with bentonite)

4. **Texas Accessibility Standards (TAS)**
   a. As a state institution, UTSA complies with the statutes of the Texas Accessibility Standards as administered by the Texas Department of Licensing and Regulation (TDLR).
      i. This compliance includes registering all projects over $50,000 in construction cost with the TDLR, either directly online or through a Registered Accessibility Specialist (RAS), and scheduling a Final Inspection at the conclusion of a project with either a RAS or directly with TDLR.
      ii. When registering the project either directly online with TDLR or through a RAS, the letters "UTSA" must be entered as the first part of the "Facility Name" field.
      iii. The project number assigned (EABPRJ No.) is to be retained and used on all correspondence related to TAS and the referenced project.
      iv. All deficiencies noted on the initial plan review and during the Final Inspection must be addressed within the timeframe granted by TDLR or the RAS. It is the responsibility of UTSA to ensure that all outstanding issues are resolved to the satisfaction of TDLR.

5. **Texas Asbestos Health Protection Rules (TAHPR)**
   a. Per the TAHPR, the presence of asbestos (ACBM) in a public building must be rebutted either through the means of a comprehensive survey or an alternative certification methodology.
      i. A survey shall conform to generally accepted industry standards (such as AHERA rules), with no less than (3) samples for each suspect homogenous area collected.
      ii. Alternatively, a Texas-registered architect or Texas-licensed professional engineer may compile the information from material safety data sheets (MSDS) of all products used in construction operations and, finding no asbestos in those products, prepare a signed written certification that the MSDSs have been reviewed, none contain ACBM and therefore the building materials do not contain asbestos.
         - Copies of all MSDSs along with copies of any previous asbestos surveys must accompany the certification to meet the requirements of a survey.
   b. The rebuttal documentation (survey or certification) must be provided to UTSA EHS&RM for their records.

## 3. UTSA Master Plan Compliance

A. Development of the greater UTSA campus is guided by the 2009 Master Plan,

which is managed by the Master Plan Management Council. The plan addresses issues relative to growth management and the quality of the physical environment. The following links are to the Master Plan design guidelines which provide direction on building design:

1. *http://www.utsa.edu/masterplan/pdfs/MP_Guidelines_Arch.pdf*
2. *http://www.utsa.edu/masterplan/pdfs/MP_Landscape_Guidelines.pdf*
3. *http://www.utsa.edu/masterplan/pdfs/MP_Sustainability_Guidelines.pdf*
4. *http://www.utsa.edu/masterplan/pdfs/MP_Signage_and_Wayfinding_ Guidelines.pdf*

## 4. Work Restrictions

A. **Noise Control**

1. To address noise that leaves the UTSA campus, and as a "good neighbor", UTSA will follow the guidelines of the City of San Antonio in regards to noise control as it affects adjacent neighborhoods. Excerpted from Section 21-52 of the City of San Antonio Ordinances is the following:
    a. The following acts, among others not hereinafter enumerated, are declared to be "noise nuisances," and are unlawful and in violation of the provisions of this division when such acts are done or accomplished or carried on in such a manner, or with such volume, intensity, or with continued duration, so as to annoy, to distress, or to disturb the quiet, comfort, or repose of any person of reasonable nervous sensibilities within the vicinity or hearing thereof, or so as to endanger or injure the safety or health of humans or animals, or so as to interfere with the physical well-being of humans or animals, or so as to endanger or injure personal or real property:
        i. The erection, including construction, excavation, demolition, alteration, or repair work, or the permitting or causing thereof, of any building or other structure, or the operation or the permitting or causing the operation of any tools or equipment used in construction, excavation, drilling, demolition, alteration or repair work:
            - Other than during the daytime on week days; or (this is defined as 6AM to 10PM Sunday through Thursday, 6AM to 11PM Friday and Saturday)
            - At any time such that the sound level at or across a real property boundary exceeds 80dBA.
            - This section shall not apply in cases of urgent necessity in the interest of public safety, or in cases of public convenience, including city sponsored or co-sponsored fiestas, parades, and public events.
2. To address noise that stays on the UTSA campus and affects occupied campus facilities, construction operations that create noise in excess of 30 dBA outside of the construction fence between the hours of 8:00 PM and 8:00 AM is restricted.
    a. This restriction is not intended to limit construction activities, only to require contractor to schedule quiet activities after

normal working hours.

b. Construction activities that generate noise greater than 30 dBA in areas of the campus that are not occupied are acceptable.

B. **Hot Work Permits (Welding, Cutting Torches, Etc.)**

1. UTSA Office of Environment Health, Safety & Risk Management issues "hot work" permits, and is required to inspect the work prior to it beginning. Permit must be posted by the contractor in areas of work.
2. The operators must be qualified to perform the work.
3. Screens and shields should be in place.
4. Oxygen and acetylene should be stored properly.
   a. Bottles should be secured with the caps on.
5. Proper eye protection and PPE should be worn.
6. Fire extinguisher located near operations.
7. Valves and regulators should be backed off each night.
8. Flashback arrestors placed on hoses (O2 and fuel gas).
9. Electrical equipment should be grounded.
10. Area should be inspected for fire hazards.
11. Gas lines and power cables should be protected and in good condition.
12. Proper ventilation should be provided.

C. **Parking for Contractor**

1. Parking inside of the construction fence is controlled by the contractor, and is allocated at the contractor's discretion.
2. Parking outside the construction fence is only allowed in areas designated by UTSA. Any vehicle parked illegally may be ticketed. In addition, the violator must pay whatever fees are associated with the ticket, i.e. no display of proper UTSA Permit, parking illegally in an unmarked area, just to mention a few.
3. The contractor and subcontractor must make necessary accommodations for off-site parking. VIA bus service is available at the 1604 campus on the north side of the Business Building, and at the Downtown campus on the intersection of Buena Vista Street and Pecos La Trinidad. VIA offers a Park-and-Ride lot at IH-10 and Loop 1604, with bus service to the 1604 Campus.
4. On a space-available basis, UTSA may make a quantity of spaces available to contractors in designated lots at the perimeter of the campus. Use of these lots will conform to the following:
   a. Parking permits will be offered to the contractor. Parking permits will not be offered to subcontractors. It is the contractor's responsibility to distribute parking permits to workers needing spaces, and to retrieve parking permits when the worker is no longer employed on the construction project.
   b. Parking permits will be purchased by the contractor, paying in advance for temporary permits, and are valid for the dates indicated on the permit.
   c. A construction lay-down area will be provided for larger projects or those that require it on a space available basis.
   d. Parking will be allowed in designated spaces in the designated parking lots.
   e. Construction workers are not allowed to use the UTSA shuttle

bus, so the contractor is required to make other accommodations to shuttle workers between the available parking and the construction site.

D. **Work After Substantial Completion**

1. UTSA will start limited business operations the day following substantial completion.
2. For any work required to complete the substantial completion punchlist, an access authorization form must be submitted by the contractor to Facilities Planning and Development.
3. During the period when limited business operations are being conducted, there will be no restrictions on the contractor working at the building, and the building will be open from 8:00 AM to 5:00 PM, Monday through Friday, on days the campus is open.
4. After limited business operations ceases, normal business operations will begin. During normal business operations, work of the contractor will be greatly restricted, if allowed at all, during normal business hours.
5. To gain access to the building for all after-hours work, the Contractor is required to obtain the services of the UTSA-Police Department, and the Contractor contracts directly with UTSA-PD. Five days notification is required to reserve UTSA-PD assistance. UTSA-PD charges for these services. There is a 4-hour minimum for reservations. Work crews working in more than one area in the building or on more than one level requires reserving 1 officer for each area. Cancellations of services with less than 48-hour notice will result in a charge of 2 hours. Contact UTSA-PD Dispatch to procure services at (210) 458-4242.

E. **Work in Occupied Facilities**

1. For any work required inside occupied facilities, an access authorization form must be submitted by the contractor, at least 7 days prior to the time access is required.
2. To gain access to occupied facilities for all work, OFPC will provide one construction inspector at no cost for 8-hours per day. If work is conducted in more than one area or one floor of the facility or if for longer than 8-hours per day, the Contractor is required to obtain the services of the UTSA-Police Department, reserving 1 officer for each area. The Contractor shall contract directly with UTSA-PD to obtain these services. Five days notification is required to reserve UTSA-PD assistance. UTSA-PD charges for these services. There is a 4-hour minimum for reservations. Cancellations of services with less than 48-hour notice will result in a charge of 2 hours. Contact UTSA-PD Dispatch to procure services at (210) 458-4242.

F. **Application of Chemicals**

1. Contractor shall receive UTSA approval prior to application of any chemicals to exterior ground surfaces, or to surfaces that will ultimately flow to ground surfaces.
2. 7 days prior to time necessary for application of materials, Contractor shall submit copies of the following
   a. Material safety data sheets (MSDS).

b. Product-packaging label.
c. Product formulation, method of application, and rate of application.

3. Such chemicals include, but are not limited to the following:
   a. Fertilizers
   b. Insecticides
   c. Herbicides
4. Application of Insecticides
   a. Applications of insecticides must be performed by a firm holding a Certified Commercial Applicator License, with category for type of treatment (P-Building Pests, T - Termites & wood pests, L - Lawn & Ornamental Pests, and W - Weed Control), or a person holding a Certified Technician License, who must be under supervision (not necessarily physically present) of a Commercial Applicator.
   b. 7 days prior to time necessary for application of materials, Contractor shall submit copies of the following
      i. License of firm and person who will be applying insecticides.
      ii. Pest Control Sign (standard form created by TXSPCB, filled in), to be posted by Contractor 48 hours prior to each treatment.
      iii. Consumer Information Sheet (standard hand out created by TXSPCB).

## 5. Project Administration

A. **Posted Construction Documents**

1. After all addenda have been issued the architect shall provide the owner with two (2) bound posted sets of construction documents (drawings and specifications) that include ALL modifications to the bid documents through addenda. Each addendum issued by the architect shall be issued on color paper with a color that is unique to that addendum (1st addendum – light green; 2nd addendum – pink; 3rd addendum – light blue; 4th addendum – yellow; 5th addendum - goldenrod). The architect shall carefully cut out each addendum item and paste in the appropriate location on a clean set of the original issuance of the construction bid documents as follows:
   a. Where a drawing or text included in the addendum exactly replaces a portion of a drawing or text included in the construction documents the architect shall use care to trim and place the addendum item with non-yellow clear adhesive Scotch brand or similar tape such that the addendum item covers and replaces the original portion of a drawing or text without obscuring portions of the drawing or text which are unaffected and not included in the addendum item.
   b. Where a drawing sheet or specification page included in the addendum exactly replaces an entire drawing sheet or specification page the entire sheet or page can replace the original in entirety provided that no other material contained on the original sheet or page which remains in effect would be omitted by the replacement.

c. Where a new drawing sheet or specification page or section is included in the addendum the new item can be added to the original construction documents.

d. Where a new drawing detail or specification text is included in the addendum the new drawing detail or specification text should be placed in appropriate available "white" space in the original construction documents. Should the layout of the original drawing not allow sufficient space within the original composition of the page the new drawing detail may be posted on the back of the immediately preceding page provided that space will be available on a scheduled drawing sheet in the record drawings to be issued after substantial completion.

B. **Subcontracts**

1. The Contractor is required to submit an alphabetized list of all subcontractors on all tiers of the work.
2. Initial list shall be submitted no later than 90 days following notice to proceed.
3. Updated list should be submitted as subcontractors are added or deleted.

## 6. Quality Control

A. **Exterior Finish Mock-ups** – Provide full-size mock-ups for exterior finish systems that can be seen in the finished building, including the following:

1. Masonry/Plaster Veneer.
2. Wood/Metal Trim.
3. Roofing.
4. Windows/Doors.

B. **Interior Finish Mock-ups** – Provide full-size mock-ups for interior finish systems that can be seen in the finished building, including the following:

1. Cabinets/Casework.
2. Painting.
3. Special finishes.

C. **Inspections**

1. In-wall Inspections
   a. Gypsum board may be installed on one side of the partition.
   b. Insulation can be installed in partitions, but shall not be placed to cover utility boxes, conduit, piping, valves, or other utility that extends through partitions.
   c. Inspection of insulation at utilities shall be considered part of the informal daily review.

## 7. Construction at Existing Facilities

A. **Inside Existing Occupied Facilities**

1. All work inside existing occupied facilities must be conducted after normal business hours, except as approved by UTSA.
2. For work inside of existing occupied facilities that operate 24-hours per day, Contactor shall submit a written request through OFPC for approval from Owner at least 4 weeks in advance. Work inside of

existing occupied facilities that operate 8-hours per day must be approved at least 2 weeks in advance.

3. Contractor must provide adequate supervision to watch all ongoing work. It is not permissible to have work crews working on more than one level or one area with only one supervisor.
4. For all work conducted in occupied buildings after normal business hours, the contractor must contract at least one week in advance with the UTSA-Police Department for the UTSA-PD to provide security assistance. One police officer is required at each area where work is ongoing. It is not permissible to have work crews working on more than one level or one area with only one police officer. The police officer will have keys to provide access to all areas authorized for work.
5. Contractor must provide identification badges to all persons working inside occupied buildings. Badges are available from UTSA for a nominal fee.
6. Contractor is prohibited from utilizing UTSA supplies, equipment, food or furniture.
7. Contractor is prohibited from taking work breaks inside of the building.
8. Contractor is prohibited from smoking inside the building.
9. Contractor is allowed to use only those restroom facilities that are designated for use by UTSA.
10. UTSA will handle reported missing materials as theft and will file a police report and pursue legal action if warranted.
11. The Contractor will replace lost items, and repair damaged items, and will return all items to their original state, and remedy other problems that can be reasonably assessed to the Contractors forces as part of the ongoing work operations, to the satisfaction of UTSA.
12. Inside unoccupied building areas (i.e., crawlspaces, mechanical rooms), the Contractor's Superintendent will be provided with keys and will be responsible for unlocking/locking all doors required for access.
    a. Prior to entering and after leaving for the day, Contractor shall contact the UTSA Police Dispatcher at 458-4242 to provide notice of ongoing work. (Doors are equipped with position switches and will notify UTSA-PD that door has been opened; please avoid unnecessary alarms.)

B. **Outside Existing Occupied Facilities**

1. With prior approval, work outside (or below) existing facilities can be conducted during normal business hours.
2. Contractor shall submit a written request through OFPC for approval from Owner 48 hours in advance when noisy activities are scheduled to be conducted which might affect UTSA. Duration of noisy activities shall be stated in written request. Work conducted without approval is subject to being stopped.
3. Contractor is prohibited from smoking below or within 20 feet of the entrance to existing buildings.
4. In areas below the building (i.e., crawlspaces, mechanical rooms), the Contractor's Superintendent will be provided with keys and will be responsible for unlocking/locking all doors required for access.
    a. Prior to entering and after leaving for the day, Contractor shall

contact the UTSA Police Dispatcher at 458-4242 to provide notice of ongoing work. (Doors are equipped with position switches and will notify UTSA-PD that door has been opened; please avoid unnecessary alarms.)

C. **Work**

1. Contractor is required to provide all tools, supplies, equipment and materials necessary to perform the work.
2. Contractor should not unplug anything. Where required, extension cords should be provided to extend power from appropriate receptacles.
   a. Contractor should not use convenience outlets inside of workspaces, unless identified for use by "Housekeeping"; these are isolated circuit receptacles.
3. Contractor should provide rags and other clean-up kits as necessary to ensure that inadvertent spills and dirt are addressed as soon as they occur, not at the end of a workday.
4. Where possible, for overhead work, contractor shall provide ladders and moveable scaffolds to minimize the requirement to move furniture and equipment.

D. **Protection**

1. All work areas shall be protected with drop cloths or plastic sheeting.
2. Existing furniture should not be moved unless absolutely necessary. Furniture that is moved should be returned to its original location.
   a. If warranted, Contractor should take photographs prior to start of work to confirm that everything is replaced correctly.
3. Existing equipment should not be moved or unplugged. If absolutely necessary for equipment to be unplugged, 24 hours notification to UTSA is required.
4. Existing furniture or equipment that is found to be dirty, broken or otherwise damaged shall be replaced by the Contractor to the satisfaction of UTSA.

E. **Clean Up**

1. Contractor is required to thoroughly clean, vacuum, and dust the work area at the end of each work period.
2. Contractor is required to provide his own waste receptacles, and remove the receptacles at the end of each work period.
3. Where walls are penetrated, clean-up is required on both sides of wall.

## 8. Temporary Facilities & Controls

A. **Temporary Electricity**

1. UTSA will provide a temporary source for electricity for the contractors use.
2. UTSA needs to know the additional consumption for our internal tracking. An estimate of electrical and water use will be made by UTSA by comparing electrical meter readings for same month from the previous year in order to get an idea of costs for construction trailers, cranes, etc.

B. **Temporary Water**

1. UTSA will provide a temporary source for water at the nearest tap for the contractors use.
2. For contractor's water truck filling, contractor will be allowed to tap a fire hydrant closest to the project site.
    a. Use of fire hydrant by Fire Department shall not be disabled.
    b. The contractor is cautioned to open the valve slowly in order to prevent rapid/extreme pressure drops in the system.
3. Contractor is responsible for installing a back flow preventer for any permanent or temporary connections to UTSA's water system.

C. **Site Enclosure Fence**

1. Provide chains and combination locks at all vehicular and pedestrian gates. Provide 1 pedestrian gate, located as directed by UTSA. Combination for all locks shall be coordinated with Facilities and UTSAPD.
2. The entire construction site must be secured at the end of day when construction activities have finished. Portions of the site that are remote from active construction activities should be secured at all times when construction personnel are not present.
    a. When finding a gate unlocked after normal construction hours, UTSA-Police will attempt to contact the Contractor and OFPC using the "Emergency Call List". If contact cannot be made, UT-Police will secure the gate.

D. **Temporary Exiting from Existing Buildings & Access**

1. Emergency exiting from existing buildings must be maintained during the entire construction process.
    a. Provide temporary walkways and/or pathways to a safe point inside the construction area.
2. Blockage of access to existing rooms at the existing buildings must be coordinated with UTSA.

E. **Temporary Hoists and Beams**

1. Temporary hoists and beams, or any other attachment to building, installed for the express purpose of lifting or moving materials or supplies, shall be designed by a structural engineer.
    a. Submit engineered drawings for review and approval.
2. With the approval of UTSA, temporary hoists and beams can be left in place as a permanent installation.
3. Hoists and beams that are left in place as a permanent installation shall have signage applied that indicates the lifting capacities, in visible locations as directed by UTSA.

F. **Removal of Temporary Facilities, Utilities and Other Construction**

1. When a temporary facility, utility or construction is no longer needed for the proper conduct of the Work, the Contractor shall completely remove it from the Project and shall repair or replace any material, equipment or finished surface damaged in doing so.

## 9. Product Requirements

A. Inclusion into Projects: Bidders have 3 methods to have products included

into projects, as follows:

1. Products specified by the architect/engineer
2. Products pre-approved by UTSA, who will provide the list to the architect/engineer
3. Products submitted by General Contractors for approval "as equal"

B. There are several very good products and manufacturers out on the market, but unfortunately A/E's don't have the time to stop and evaluate products from every vendor that calls.

C. UTSA will notify the A/E in writing if a product is to be considered for a project other than what has been documented prior to issuance for bid.

D. The A/E should ensure that appropriate language provides a mechanism for vendors to submit as an equal, by providing information through a general contractor.

E. **Proprietary Specifications**

1. Where inclusion of a specific product is required by UTSA, a proprietary specification is required. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form for each project, as applicable. Substitutions are not allowed for proprietary items.
2. Acceptable manufacturer and product will be listed on the justification form.
3. Some projects, due to proximity and integration with existing projects, may require proprietary specifications on non-typical items. These items will be identified on a job-by-job basis.
4. Following is a summary of all typical proprietary specifications used at UTSA:

| *Item* | *Manufacturer/Product* |
|---|---|
| Irrigation, Spray Heads | TORO |
| Irrigation, Rotary Heads | Hunter, PGP |
| Irrigation, Quick Coupler Valves | Rainbird |
| Irrigation, Remote Electric Valves | Weathermatic |
| Irrigation, Controller | Hunter Pro-C, outdoor, with wiring harness for remote capability |
| Irrigation, Controller Remote | Hunter Pro-C remote (ICR-R) |
| Irrigation, Isolation Valves | SPEARS |
| Irrigation, Swing Joints | KBI or Hunter |
| Irrigation, Rain Sensor | Hunter, Wireless Rain Click |
| Door Hardware, Mortise Locksets | Corbin Russwin, series #ML2200 |
| Door Hardware, Exit Devices | Von Duprin, series #99 |
| Door Hardware, Closer | Corbin Russwin, series #DC6200 |
| Door Hardware, Card-key Locksets | Locknetics |
| Fire Alarm System | Simplex |

| | |
|---|---|
| Clock System | Simplex |
| Building Automation System | Siemens Building Technology, Apogee |
| Environmental Monitoring System | Edstrom Industries |
| Data/Telecommunications | AVAYA/SYSTIMAX |
| Security, Alarm Monitoring System | DSX Access Systems, Inc., DSX-1048PKG |
| Security, Door Position Switches | GE Interlogix Sensors and Detectors, Sentrol |
| Security, Access Control Software | DSX Access Systems, Inc., WinDSX SQL Server Addition |
| Security, Card Readers, Proximity | HID Corporation, Models 5365 and 5355 |
| Security, Card Readers, Swipe | DSX Access Systems Inc., Model MR-10 or MR-20 |
| Security, Intercom Systems | Zenitel USA, Inc., Alphacom |
| Security, CCTV Systems | Salient Systems Corp., Complete View, model CV16-0320 |

## 10. Project Close-Out

A. All project close-out items submitted to UTSA shall be boxed and/or bound as specified (or as appropriate if not specified) in the Project Manual and submitted with a fully coordinated Master Table of Contents.

1. UTSA will rely on the contractor and all consultants to provide a coherent, organized submittal ready for receipt by UTSA Archives.
    a. The Master Table of Contents shall indicate box or binder number, associated subcontractor/vendor, referenced project manual section of submitted item, submittal permutation, quantity of submittal and brief description. It shall include, but is not limited to:
        i. Project Manual & Addenda (with all sections listed in the Contents)
        ii. Product Data Submittals (with all sections listed in the Contents)
        iii. Final O&M Manuals (with all sections listed in the Contents)
        iv. Final Guarantee & Warranties
        v. Test & Balance Report
        vi. Final Record Drawings (with all drawings listed in the Contents)
    b. UTSA requires all submitted close-out items to be accompanied with an electronic copy, saved in the Adobe Acrobat .pdf format.
2. The contractor will submit close-out items within 60 days of the date of Final Completion.

B. Project record drawings shall be submitted to UTSA in the following three (3)

formats, and shall incorporate all addenda, change orders, and modifications recorded by the contractor on the field as-built drawings: (a.) AutoCAD and Revit (BIM) as required by B(6)(a) and (b); (b.) Paper (3 sets) using a 30" x 42" bond paper sheet size; and (c.) electronic Adobe Acrobat .pdf using a 30" x 42" sheet size.

1. Record drawing electronic files shall include all necessary externally referenced files attached to the following floor plans and diagrammatical detailed plans:
    a. civil
    b. architectural
    c. structural
    d. mechanical
    e. electrical
    f. plumbing
    g. fire suppression system
    h. security system
    i. fire alarm system
    j. laboratory casework and equipment
2. Project record drawings shall be submitted to UTSA within 60 days of the date of Final Completion by the Architect.
3. Upon its completion, a copy of the pre-construction survey in accordance with item 5 shall be provided to UTSA Office of Facilities.
4. Upon substantial completion of the project, a project survey in accordance with item 5 shall be provided to UTSA Office of Facilities. It shall capture the entire project scope.
5. All buried valves (gas, water, irrigation, etc.), boxes and manholes located within the limits of construction shall be indicated on as-built drawings with G.I.S. coordinates, depth of cover, materials and sizes embedded. State Plane and AIA Layering Standards shall be followed. All projects will collect project data for as built information using the best, most accurate means possible but not less than,
    a. Texas Society for Professional Standards for a Category 6, Condition 1 Survey on Topographic Surveys.
    b. FGDC and TXDOT Standards when establishing Primary and Secondary campus controls and for project survey information.
        i. Control Surveys:
            - Horizontal network: 1:10,000 closure
            - Vertical Network: 0.05 * sqrt of miles in level loop (must be performed using differential leveling, preferably digital levels)
        ii. Design topographic surveys (utility as-built):
            - Horizontal tolerance of +/-0.10-foot
            - Vertical tolerance of +/-0.05-foot
        iii. Coordinates shall be rounded to two decimal places.
        iv. Control points should be labeled as northing, easting, elevation, and a clear and unambiguous description.
        v. Surveyors shall consider the surroundings and almanac to collect data at optimal times and under optimal conditions.
    c. For projects not collecting survey grade information, the best possible method of data capture should be used, preferably

differentially corrected mapping but no more than 3 meters horizontal and at least the accuracy of a measuring tape for depth; every 40 feet. All utility infrastructure including vents, valves, boxes, meters, risers, elbows, cleanouts, junctions, tees, conduits, culverts, pipes, outfalls, inlets or other utility structures shall be collected.

d. As built data will contain metadata which details accuracy or grade, the coordinate of collection and communicates the method of capture. If an offset is used a conversion factor for re-projecting data into NAD83 State Plane Texas South Central FIPS 4204 FEET will be provided.

e. Project coordinates shall be embedded in drawing file.

6. UTSA currently maintains building information modeling (BIM) for each building on campus.
   a. For projects with a construction cost greater than $2M, record drawings shall be submitted in BIM (IFC) format and AutoCAD (.dwg) format in strict accordance with the current National BIM/CAD Standard (AIA) – United States.
   b. For projects with a construction cost equal to or less than $2M, record drawings, at the discretion of the Architect, may be submitted in accordance with item B(6)(a) or in AutoCAD (.dwg) format in strict accordance with the current National CAD Standard (AIA) – United States.
7. Record drawing submission in Adobe Acrobat .pdf format shall conform to the following criteria:
   a. Capable of text recognition with text searchable by keyword search.
   b. Separate files segregated by discipline.
   c. Individual sheets bookmarked within in each file.
   d. Capable of printing a single page or multiple pages within a file.

C. Project as-built specifications shall be submitted in Adobe Acrobat .pdf format and meet the criteria as set for record drawings in Section 10(B)(5), above.

D. Additional documentary close-out documentation is to include the Project Color Book (the finishes installed), Furniture Bid Documents, Substantial Completion Acceptance Letters (with Punchlist attached), TCEQ & TDLR Documents, geotechnical reports, and letters from each architect, engineer and general contractor stating that the building or renovation was designed, specified and built with no asbestos-containing materials.

## 11. Project Commissioning

A. **Demonstration and Owner Training**

1. Unless otherwise noted, all demonstrations and training shall be conducted during normal business hours, Monday through Friday, when UTSA is open.
2. The following demonstrations and training shall be scheduled such that none of items or combination of items exceeds more than 4 hours in one day or 12 hours in one week:
   a. Elevator
   b. HVAC Systems and HVAC Controls

c. Fire Alarm Systems (including panel, devices and fire pumps)
d. Generators
e. Lighting Systems and Controls

3. A second demonstrations and training session shall be provided on a Tuesday or Wednesday, starting at 10:00 PM and not exceeding more than 4 hours in one day or 8 hours in one week, for each of the following:
   a. HVAC Systems and HVAC Controls
   b. Fire Alarm Systems (including panel, devices and fire pumps)
   c. Lighting Systems and Controls
4. Demonstrations and training for the following disciplines shall be scheduled such that none exceeds more than 4 hours in one day or 12 hours in one week:
   a. Plumbing
   b. Electrical
   c. Telephone
   d. Data
   e. Security
5. All other demonstrations and training shall be scheduled such that none exceeds more than 4 hours in one day or 12 hours in one week.
6. Professional grade videotaping of training shall consist of the following:
   a. A script outline developed for the trainer to follow, and approved by UTSA prior to the taping.
   b. A qualified trainer; submit resume of all personnel participating in the training.
   c. Special lighting to illuminate trainer and subject matter.
   d. Special microphone/audio system to amplify trainer and audience participants.
   e. Special document camera to include close-ups of diagrams and graphic materials presented.
   f. Digital video camera to produce one master digital video disc (DVD) for each training session. Provide one DVD copy of each training session.
   g. Film editing to include insertion of project title, training session title, date, introductions, credits, etc.
   h. The following firms are approved to provide professional grade videotaping of training:
      i. Matson Multi-Media
      ii. Maverick Video Products
      iii. 1st Video of San Antonio

## 12. Coordination of Standards

A. This "UTSA Design & Construction Standards" document will identify specific elements required to be implemented on any project.

B. The "Design Program" document will identify those items of work that are anticipated to be included for the project under consideration. It will also define the scope of work. Examples include:
   1. This project includes the removal of all vegetation in the building and parking/drive areas.

2. The scope of this project does not stop at 5 feet away from the building line, but is a turnkey project that includes all site development and other costs for the entire project.

*Division 02*

# Existing Conditions

## 1. Basic Sitework Requirements

A. **Parking**

1. Any handicapped accessible parking spaces that are removed as part of the construction process must be relocated as part of Phase I of the project.
2. Any standard parking spaces that have parking meters must have the parking meters relocated as part of Phase I of the project.
3. In parking garages, an equal number of accessible parking spaces must be located in protected (covered) parking spaces, if available.
4. The general guidelines followed at UTSA for parking design are as follows:
    a. Parking is provided on a campus wide basis (not a building-by-building basis) in excess of the code-mandated minimums.
    b. UTSA currently has approximately 15,000 parking spaces on the 1604 campus with additional spaces available by shuttle bus off campus.
    c. UTSA through Business Auxiliary Services will determine parking requirements for individual buildings.
    d. Accessible parking spaces will be provided at each building for the known and/or anticipated users requiring such spaces.
    e. UTSA does not have compact car parking on campus currently and does not want it included in any new facilities.
5. The TAS/ADA code requires:
    a. Spaces need not be provide in one particular lot. They may be provided in a different location if equivalent or greater accessibility, in terms of distance from an accessible entrance, cost and convenience is ensured.
    b. If parking spaces are provided for self-parking by employees or visitors, or both, then accessible spaces shall be provided in each parking area.
    c. 20 accessible parking spaces plus 1 for each 100 over 1000. For the 1604 Campus, this equates to 126 total accessible parking spaces (20+((10600/100)*1)).
        i. Of the 11,600 parking spaces at the 1604 campus, UTSA has a total of 261 accessible parking spaces.
    d. 1 of every 8 spaces are required to be van accessible. For the 1604 Campus, this equates to 16 total van accessible parking spaces (126/8).
        i. Of the 11,600 parking spaces at the 1604 campus, we have a total of 98 that are van accessible.
    e. Where parking is provided for residents, accessible parking should initially be provided in accordance with the code

requirements.

i. Since accessible units are not always occupied by persons requiring accessible parking, accessible parking requirements will be determined on a semester-by-semester basis, and quantities adjusted as necessary.

B. **Pedestrian Traffic**

1. Existing pedestrian traffic routes must be accommodated during construction. Provide temporary routes and/or walks as necessary.

C. **Fire Department Access**

1. UTSA will obtain review comments from the City of San Antonio Fire Department on any issues related to access and connection points for fire department equipment.
2. The first choice for access to buildings is on paved streets running adjacent to the building.
3. Fire department equipment will jump curbs to gain access to buildings, but substantial drivable surfaces must be provided.
4. Fire Department vehicles will not back up greater than 50 feet. Where dead-ends cannot be avoided, a drivable surface needs to be added to connect the dead-end with another street or roadway.

D. **Site Furnishings**

1. Site furniture, including benches, tables, trash receptacles, and bicycle racks are typically part of the new building, and is handled as part of the interior furniture procurement for the building.

E. **UTSA Shuttle Bus**

1. Shuttle bus critical information:
   a. Capacity: 57 passengers
   b. Size: 45' long, 8'-6" wide, 11'-6" high
   c. Weight: 38,660 pounds empty
   d. Turning radius: 48 feet inside, 56 feet outside.

## 2. Selective Demolition

A. Owner will be continuously occupying areas of the building adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of UTSA's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities which will severely impact UTSA's normal operations.

B. A Utility Locater Service shall be obtained by the contractor to locate all existing utilities in the area of excavation before work is performed; those utilities locations shall be documented and transmitted in the O&M manuals required at the end of the project.

C. Conditions existing at time of commencement of contract will be maintained by Owner insofar as practicable. However, variations within structure may occur by UTSA's removal and salvage operations prior to start of selective demolition work.

1. Items indicated to be removed but of salvable value to Contractor may

be removed from structure as work progresses. Transport salvaged items from site as they are removed.

2. Storage or sale of removed items on site will not be permitted.
3. Provide temporary barricades and other forms of protection as required to protect UTSA's personnel and general public from injury due to selective demolition work.

D. Provide protective measures as required to provide free and safe passage of UTSA's personnel and general public to and from occupied portions of building.

1. Erect temporary covered passageways as required by authorities having jurisdiction.
2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
3. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
4. Protect floors with suitable coverings when necessary.
5. Construct temporary insulated solid dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.
6. Provide temporary weather protection during interval between demolition arid removal of existing construction on exterior surfaces, and installation of new construction to insure that no water leakage or damage occurs to structure or interior areas of existing building.
7. Remove protections at completion of work.
8. In event materials containing asbestos are encountered during the course of demolition work, the Contractor shall cease operations involving such materials and engage a licensed industrial hygienist acceptable to Owner, to remove the asbestos material. Cost of such work involving asbestos materials will be paid for by the Owner under a Change Order to the Contract. Follow applicable requirements of the Environmental Protection Agency.
9. Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

E. Wherever existing piping insulation is disturbed or removed, or new insulation is added, provide "asbestos free" self-adhesive signs on the outside of the final jacketing.

1. Signs shall have minimum 3/4" high white lettering on blue background, equal to W. H. Brady Co., catalog #90293.

F. **Existing Trees**

1. Pruning, treatment or relocation of existing trees required to accommodate construction must be conducted under the direct supervision of a certified arborist.
    a. A certified arborist is an individual who has a current and valid designation of "ISA Certified Arborist" by the International Society of Arboriculture.
    b. Proof of licensure as provided by the City of San Antonio is

acceptable.

2. Live oaks and red or Spanish oaks, are susceptible to the oak wilt disease. There is no cure for oak wilt, which can kill established trees within weeks.
   a. An insect called the sap beetle is a long-distance carrier of the disease, since it is drawn to the sweet smell of the fungus, whose spores can attach to the beetle, then reattach to open wounds on a healthy tree.
   b. To reduce the risk of oak wilt, experts recommend pruning in December or January, or during the summer, when sap beetles are less active amid extreme heat or cold. Pruning should be avoided from Feb. 1 to June 1.
   c. Open wounds should be covered with an acceptable pruning solution to seal the wounds the same day the wound or cut is created.
3. Tree Protection
   a. Galvanized steel, chain link fencing shall be installed prior to beginning of any site work, to protect root system under drip line of existing trees. Parking of equipment and vehicles or storage of materials will not be allowed under the drip line of trees.
   b. Where chain link fencing cannot be installed, and when chain link fencing is removed and there is still heavy equipment or landscape work continuing on the site, provide trunk planking consisting of 2 x 4 or 2 x 6 wood planking attached with plastic strapping shall be installed to protect existing tree trunks up to 8 feet above grade. This shall be installed prior to beginning of any site work, and removed only with the approval of UTSA.
   c. Grade changes greater than plus-or-minus 3 inches under the drip line of existing trees are not allowed without prior approval.
   d. Soil or mulch shall not be placed directly on or within 6 inches of the base of existing tree trunks.
   e. Trenching within the drip line of existing trees is not allowed without prior approval.

*Division 03*

# Concrete

## 1. Concrete Reinforcement

A. Reinforcing shall be fabricated in accordance with Manuel of Standard Building Code Requirements for Reinforced Concrete (ACI 318) latest edition. The Contractor shall be responsible for obtaining properly fabricated reinforcing and placing it properly.

B. Reinforcing steel at the time concrete is placed shall be free from rust, scale, dried concrete, or other coatings that will destroy or reduce bond.

C. Reinforcing steel shall be accurately bent and placed in position, securely tied or supported to prevent movement during lacing of concrete. Field bends will not be permitted without prior approval from Engineer.

D. Unless detailed otherwise on plans, reinforcing bars shall have concrete cover as follows:
   1. Beam Stirrups; top, bottom and sides, 1-1/2".
   2. Column ties and spirals, 1-1/2".
   3. Concrete joists and slabs, 3/4".
   4. Spread or spot footings, 3".

## 2. Cast-In Place Concrete

A. **Exterior Surfaces**
   1. Exterior flat surface floors of the building that are exposed to the elements should be sloped to eliminate standing water.
      a. For large areas, provide floor drains.

B. **Fly Ash**
   1. Fly ash may be used as a pozzolan to replace a portion of the Portland Cement in a concrete mix, subject to the approval of the Structural Engineer. Fly ash, when used, shall conform to ASTM C-618. Concrete mixes using fly ash shall be proportioned to account for the properties of the specific fly ash used and to account for the specific properties of the fly ash concrete thus resulting. The ratio of the amount of the fly ash to the total amount of fly ash and cement in the mix shall not exceed 20 percent.

C. **Concrete Aggregates**
   1. Comply with ASTM C-33. Maximum aggregate size is 3/4" for columns and floor slabs; 1-1/2" elsewhere.

D. **Temperature**
   1. Concrete when deposited shall have a temperature not below 50

degrees F and not above 90 degrees F.

## 3. Special Concrete Finishes

A. Maintain control of concrete chips, dust and debris in each area of work. Clean up and remove such material at completion of each day of application. Prevent migration of airborne materials by use of tarpaulins, wind breaks and similar containing devices.

## 4. Mud Slab

A. Provide 2" thick, 2,500 psi unreinforced mud slab in crawl spaces.

*Division 04*

# Masonry

## 1. Unit Masonry

A. **Construction Tolerances**

1. Variation from plumb: for vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more.
2. Variation from level: for lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 3/4" in 40' or more.
3. Variation of linear building line: for position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.
4. Variation in cross-sectional dimensions: for columns and thickness of walls, from dimensions shown, do not exceed -1/4" nor +1/2".

B. Mock-up of unit masonry is required, minimum 6 feet wide by 4 feet high.

C. Face brick installed at the jobsite shall not exceed the range of color, texture, finish, size, chipping, cracking, and imperfection or tolerance effects exhibited by the final accepted mockup.

**D. Job Conditions**

1. Store and handle masonry units off the ground, under cover, and in a dry location. If units become wet, do not place until units are in an air dried condition.
2. Prevent grout or mortar from staining face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
3. Protect sills, ledges and projections from droppings of mortar.

E. For all exterior exposed units, provide standard manufacturer's units of dense aggregate (ASTM C33). Dense aggregate units are to include an integral water repellant agent in the mix.

F. Provide stainless steel anchors and ties at cast stone installations. Do not use corrugated metal ties.

G. Do not lower freezing point of mortar by use of admixtures or anti-freeze agents. Do not use calcium chloride in mortar or grout.

H. Strike joints facing cavity, flush.

I. Provide anchoring devices of type shown and specified in construction documents. For conditions not shown or specified, provide standard type for facing and back-up involved.

J. **Lintels**
1. Install loose lintels of steel and other materials where shown.
2. Provide masonry lintels where shown and wherever openings of more than 1'-0" are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Thoroughly cure precast lintels before handling and installation. Temporarily support formed-in lintels.
3. For hollow masonry unit walls, use specially formed "U"-shaped lintel unit-with reinforcing bars placed as shown and filled with Type S mortar or concrete grout.

K. **Control & Expansion Joints**
1. Provide vertical expansion, control and isolation joints in masonry. Build-in related masonry accessory items as masonry work progresses.
2. If location of control joints is not shown, place vertical joints spaced not' to exceed 30'-0" o. c. Review location of joints with Architect before execution.

L. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

## 2. Stonework

A. Fabricate and install stonework to withstand normal loads from wind, gravity, movement of building structure, and thermally induced movement, as well as to resist deterioration under conditions of normal use including exposure to weather, without failure.

B. Provide stonework which is designed, fabricated and installed based on the following safety factors applied to minimum physical properties of stone indicated.
1. Safety Factor for Limestone and Sandstone: 8
   a. Provide hand-set stone anchoring system which results in attachments developing the capability to sustain the following forces generated by the supported element (individual member or assembly) acting separately, based on the yield strength of the material:
   b. A total force of 4 times the dead weight of the element supported, app1ied vertically downward through the element's center of gravity, combined with loads caused by thermal movements.
   c. A total force of 2 times the dead weight of the element applied horizontally outward through the center of gravity of the element, combined with loads caused by thermal movements.

C. **Quality Assurance**

1. Obtain each color, grade, finish, type and variety of stone from a single quarry with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to cut and finish material without delaying the progress of the work.
2. Obtain mortar ingredients of uniform quality and from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.
3. Obtain each type of stone accessory, sealants and other materials from one manufacturer for each product.
4. Prepare mock-ups for the following types of stonework. Purpose of mock-ups; is further verification of selections made for color and finish under sample submittals and establishing standard of quality for aesthetic effects expected in completed work. Build mock-ups to comply with following requirements:
    a. Locate mock-ups on site where indicated or, if not indicated, as directed by Architect.
    b. Build mock-ups for the following types of stonework:
        i. Typical exterior stone-veneer-faced masonry wall, approximately 6' long by 4' high.
    c. Retain mock-ups during construction as standard for judging completed stonework. When directed, demolish mock-ups and remove from site.

D. **General Materials**

1. Comply with referenced standards and other requirements indicated applicable to each type of material required.
2. Provide matched blocks from a single quarry for each type, variety, color and quality of stone required. Extract blocks from a single bed of quarry stratum, especially reserved for Project, unless stones from randomly selected blocks are acceptable to Architect for aesthetic effect.

E. **Limestone**

1. Mock-up of limestone is required, minimum 6 feet wide by 4 feet high.
    a. No random lengths smaller than 12".
    b. The limestone with yellow/orange coloring needs to be more randomly placed.
    c. The textured/roughest side of the limestone needs to be placed to the exterior.

F. **Mortar and Grout Mixes**

1. Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellents agents, anti-freeze compounds, or calcium chloride, unless otherwise indicated.

G. **Stone Fabrication**

1. Finish exposed faces and edges of stones to comply with requirements indicated for finish under each type and application of stone required to match approved samples and field-constructed mock-ups.
    a. Cut stones from one block or contiguous, matched blocks in which natural markings occur.

b. Arrange panels in blend pattern.

2. Carefully inspect finished stones at fabrication plant for compliance with requirements relative to qualities of appearance, material and fabrication; replace defective stones with ones that do comply.

3. Grade and mark stones for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stones match range of colors and other appearance characteristics represented in approved samples and field-constructed mock-ups.

H. **Adjusting and Cleaning**

1. Remove and replace stonework of the following description:
   a. Broken, chipped, stained or otherwise damaged stones. Repair will be allowed only to the extent the results are acceptable to the Architect.
   b. Defective joints.
   c. Stones and joints not matching approved samples and field-constructed mock-ups.

2. Replace in manner which results in stonework matching approved samples and field-constructed mock-ups, complying with other requirements and showing no evidence of replacement.

*Division 05*

# Metals

## 1. Structural Steel

A. Structural steel framing is an acceptable framing material for sloped roofs and miscellaneous structural elements.

B. Bar joists are acceptable if in accordance with AWSD 1.1.

C. Any structural steel exposed to the environment must be galvanized.

D. Provide steel hoist beams at areas used primarily for mechanical equipment where heights above finished floor are excessive. Hoist beams will be used for raising/lowering tools and equipment, and should be sized to lift the heaviest piece of equipment in the space that could be replaced. Such areas would include:

1. Mechanical mezzanines.
2. Elevator penthouses.

E. Provide adequate and appropriate structural steel framing, approved by engineer, to support and mount all mechanical equipment resting on structural steel framing including roof top units. Loads shall be transmitted directly to steel beams, joists, etc., which shall be modified or strengthened to properly support such loading.

F. Shop paint all structural steel one coat of primer, with the exception of:

1. Steel to be encased in concrete.
2. Surfaces to be field welded with full penetration groove welds or fillet welds larger than 3/16" size.
3. Exterior exposed steel (galvanized)

G. **Connections**

1. Field correcting or altering by "torching" or otherwise, will not be permitted unless prior approval is obtained from the Engineer. This applies to fabrication errors as well as work to accommodate other trades. Any errors which prevent the prior assembly of parts as detailed shall be reported to the fabricator for correction.
2. Splices will be permitted only when indicated. Splices may be omitted and beams furnished continuous in long lengths if desired.
3. The procedure and sequence of all shop and field welding shall be such as will avoid distortion of members and connections.
4. Erect structural steel accurately to lines and levels. Members shall be in final position before permanent connections are made.

## 2. Open Web Steel Joists

A. All steel joists and accessories shall receive one shop coat of paint meeting the requirements of the Steel Joist Institute specifications. Where joists are exposed to view, the shop coat shall be Zinc Chromate or Red Oxide.

B. Do not begin placement of joists until support members are in place and secured.

C. No field cutting or altering of joists will be permitted, unless prior approval is obtained from the Engineer. Joists improperly fabricated shall be reported to the Manufacturer for correction.

D. Provide adequate and appropriate structural steel framing, approved by the engineer, for the support and mounting of mechanical equipment resting on, or suspended from, steel joists. No concentrated loads, hangers, etc. shall be attached to the top or bottom chord of joist except at "panel points" (the junctures of chords and diagonal web members.) Joists shall be modified or strengthened to carry such loads.

E. Provide any temporary bracing that may be required to resist all wind and construction loads. Erection equipment methods employed, shoring scaffolding, etc., shall be suitable and safe for workmen, and shall be maintained in a safe and stable condition

## 3. Metal Decking

A. Steel shall be thoroughly cleaned in a chemical bath, followed by a rinse, phosphatized, rinsed, dried and properly prepared for painting. After phosphatizing, the surface shall be roller coat painted to insure an even protective covering with a gray flexible primer which when oven cured, shall have a moderate reflectance value.

B. Sloping roofs having a slope of 1/4" per foot or more shall be erected beginning at the low side so that laps are made "shingle" fashion.

## 4. Cold-Formed Metal Framing

A. Web cut outs or perforations in studs shall not be placed closer than 2 times s tud width to the top or bottom of each stud.

B. Install supplementary framing, blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures1 equipment, services, casework, heavy trim and furnishings and similar work requiring attachment to the wall or partition. Coordinate blocking requirement with appropriate trades. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.

C. Frame wall openings larger than 2 feet square with double stud at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding1 and space jack studs same as full-height studs of wall. Secure stud

system wall opening frame in manner indicated.

D. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of stud system.

## 5. Metal Fabrications

A. **General Fabrication**

1. Form exposed work true to line and level with accurate angles and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
2. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
3. Galvanizing: provide a zinc coating for those items shown or specified to be galvanized, as follows:
   a. ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 1/8" thick and heavier.
   b. ASTM A 386 for galvanizing assembled steel products.
4. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

B. **Miscellaneous Metal Fabrications**

1. Loose steel lintels: provide lintels for openings and recesses in Masonry walls and partitions as shown. Weld adjoining members together to form single unit where indicated. Provide not less than 8" bearing at each side of openings, unless otherwise shown.
2. **Steel Railings & Handrails:**
   a. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1 1/2" clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required for design loading.
   b. Close exposed ends of pipe by welding 3/16" thick steel plate in place, or by use of prefabricated fittings.
   c. Galvanize exterior steel railings, and interior steel railings where shown, including pipe, fittings, brackets, fasteners and other ferrous components.
3. **Ornamental Metalwork**
   a. Where metal grills are located over finish surfaces or openings such as windows or louvers, the grill must be removable for future maintenance.
4. **Metal Stairs**
   a. Interior Stairs
      i. If unenclosed stairs are provided, they should be upgraded in quality, compatible with other adjacent interior finishes.
   b. Exit Stairs
      i. Acceptable construction for exit stairs is steel framing (closed riser), concrete in-filled pans and landings

(sealed concrete, painted metal), with painted metal pipe handrail.

ii. Where stairs extend to roofs and crawl spaces to provide access for maintenance, provide a means to prohibit access by authorized personnel only. Do not allow the general public beyond the floor of legal exit.

c. Exterior Stairs (Steel Framed)

i. Form metal pans of galvanized carbon steel sheet, where indicated and at exterior locations.

5. **Guardrails**

a. Guardrails are required at any area adjacent to a 30" or greater fall. This applies to all areas accessible by any person, whether general public, UTSA employee/maintenance staff, or vendor. Apart from areas accessible to the public, also included are flat roofs, mezzanines, catwalks, and any other area that is intended for maintenance access.

b. Guardrails are to be a minimum 42" high, measured above the finished floor, not from the floor structure.

6. **Steel Non-Slip Grip Plate**

a. All steel plates located at sidewalk under drains shall be ¼" thick, Grade 2 (Medium), commercial quality with width to align with width of existing adjacent sidewalk. Approved product is SlipNot by W.S. Molnar Company or UTSA-approved equal.

*Division 06*

# Wood, Plastics & Comp.

## 1. Rough Carpentry

A. Plywood Backing Panels: For mounting electrical or telephone equipment provide fire-retardant treated plywood panels with grade PLUGGED INT with exterior glue, in thickness indicated, or, if not otherwise indicated, not less than 15/32".

B. **Gypsum Sheathing**

1. Provide gypsum sheathing board with silicone impregnated core and glass mat facing both sides complying with FS SS-L-30 for Type II (sheathing) Class (water-resistant surfaces), Grade (core) and Style indicated below; and with ASTM C 79.
   a. Grade W: Water-resistant treated core.
   b. Thickness: 1/2"
   c. Size: 4'-0" x 8'-0" or 9'-0" as required for coordination with framing.
2. Subject to compliance with requirements, acceptable manufacturers and products include:
   a. Georgia-Pacific Dens-Glass Gold Gypsum Sheathing
3. Protection of gypsum sheathing by an air-infiltration barrier is required.
   a. Divergent point galvanized staples is not an acceptable attachment method.
   b. Installation of nail/screws should be through 1-inch (min.) diameter metal discs.

C. Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating (ASTM A 153).

D. **General Installation**

1. Countersink nail heads on exposed carpentry work and fill holes.
2. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish material.. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.

## 2. Custom Casework

A. **Cabinets**

1. Wall cabinet depths are standardized at 12-3/4 inches.
2. Countertop heights in workrooms should be 34" at accessible sinks and 36" for balance.
3. Sitting height cabinets can have 1 file drawer, 1 standard drawer and 1

bread board, or 1 file drawer, 2 standard drawers, or 2 file drawers, or 3 standard drawers.

4. Keyboard drawers should be 24 inches outside, with 22 inches clear inside.
5. Keyboard drawers with a mouse pad should be 30 inches outside, with 28 inches clear inside.

B. **Plastic Laminate Countertops**

1. Plastic laminate should not be used at lavatories.
2. Use plywood at all plastic laminate countertops.
3. Use marine grade plywood at sink tops.
4. Provide splashes at countertops with sinks or lavatories, and in rooms that have other countertops with splashes. Extend splash along back and sides of countertops where there is an abutting wall.

C. **Plumbing Protection**

1. Do not install rigid cover panels to protect plumbing. Install insulation with vinyl cover as part of toilet accessories.

D. Formaldehyde Emission Levels: Comply with formaldehyde emission requirements of each voluntary standard referenced below:

1. Particleboard: NPA 8
2. Medium Density Fiberboard: NPA 9
3. Hardwood Plywood: HPMA FE

E. **General Fabrication**

1. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and in installation areas.
2. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
   a. Corners of cabinets and edges of solid wood (lumber) members less than 1 inch in nominal thickness: 1/16 inch.
   b. Edges of rails and similar members more than 1 inch in nominal thickness: 1/8 inch.
3. Complete fabrication, including assembly$_1$ finishing, and hardware application, before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
4. Factory-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to product accurately sized and shaped openings. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges of cutouts with a water-resistant coating.

F. **Installation**

1. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8-

inch in 8'-0" for plumb and level (including tops) and with no variations in flushness of adjoining surfaces. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

2. Standing and Running Trim and Rails: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns and miter at corners.
3. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors -and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated. Maintain veneer sequence matching (if any) of cabinets with transparent finish.

## 3. Solid Polymer Fabrications (Solid Surfacing Materials)

A. Solid Surfacing Materials should be used at all lavatories where a countertop is provided.
   1. Provide back and sidewall splashes. Extend splash along back and sides of countertops where there is an abutting wall.

B. Warranty - 10 years for materials and installation.

C. Acceptable materials - Du Pont de Nemours "Corian", Ralph Wilson Plastics "Gibraltar", Formica "Surell".

D. Sizes: 3/4" for countertops, 1/2" for vertical applications.

*Division 07*

# Thermal/Moisture Prot.

## 1. Bituminous Waterproofing

A. For interior and concealed-in-wall uses, provide type of bituminous damp proofing material which is warranted by manufacturer to be substantially odor-free after drying for 24 hours under normal conditions.

B. Do not allow waterproofing materials to enter and clog drains and conductors. Prevent spillage and migration onto other surfaces of work, by masking or otherwise protecting adjoining work.

## 2. Building Insulation

A. Unless otherwise indicated, provide insulation thickness required to achieve R-13 at vertical installations and R-26 at horizontal installation. Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface Burning Characteristics: ASTM E 84
2. Fire Resistance Ratings: ASTM E 119
3. Combustion Characteristics: ASTM E 136

B. Provide insulation systems that conform to the requirements of the State Energy Code, General Services Commission.

C. Problems with condensation in rooms above existing crawl spaces have not been a problem at UTSA. Insulation below the floors located directly above crawl space is not required. If condensation becomes a problem in the future, UTSA will mechanically attach insulation below the concrete structure as needed.

## 3. Firestopping

A. Seal spaces around pipes, conduits, and ducts that penetrate fire walls, partitions, and floors using assemblies having equal or greater fire rating as the element being penetrated.

B. Provide products which have been tested in accordance with ASTM 119 (or UL 263, ANSI A2.1 or NFPA 251) for fire-resistance, and rated by UL or other industry-recognized agency for the required resistance.

C. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

## 4. Roofing Tiles

A. **Clay Roof Tiles**

1. Durability: ASTM C 1167-1996 clay tiles, Grade 1, with factory-made fastening holes.
   a. Grade 2 is acceptable for apartment grade construction.
2. Manufacturer/Product:
   a. Gladding McBean "Placer Interlocking Clay Tile", Kiln Run No. 8
   b. D'Hanis Brick & Tile Co. "75% Red Oxide, 20% Moroccan and 5% Mocha"
   c. Ludowici "Classic XL Tile", Clay Red
3. Size: Maximum 10 in. wide, 15 in. long, 12 in. exposure; minimum 9 in. wide, 14 in. long, 11 in. exposure.
4. Style: Flat, interlocking
5. Finish: Unglazed
6. Design Rationale: The concept has been to use Ludowici and Gladding McBean clay tile on the central UTSA 1604 campus buildings, while the D'Hanis clay tile is designated for the more remote structures, ie. West Campus and Resident Housing. Each manufacturer has an approved blend – indicated above at (2.) – and these shall be rigidly adhered to unless otherwise approved by UTSA during design.
   a. Ludowici clay tile has been used at the Main Building (a.k.a. Academic Building III)
   b. Gladding McBean clay tile has been used at the Recreation and Wellness Center (Phases I & II), BSE, Engineering Building II and the University Center Expansion Phase III
   c. D'Hanis clay tile has been used at the Chaparral Village, Laurel Village and the Roadrunner Café
7. Provide matching factory-made specially shaped pieces for ridges, rakes and eave closure.
8. Provide tiles of diminishing widths for circular bays or round towers.
9. Fasteners to be copper or brass and as required by code.
   a. Fasten each tile with a minimum of two nails.

## 5. Manufactured Roof Panels

A. **Sheet Metal Roofing Panels**

1. Provide heavyweight panels, ASTM A653/A 653M-1998, G90/Z275 galvanized; prefinished galvanized sheet steel.
2. Factory Finish: Fluorpolymer coating.
3. Color:
   a. As approved by UTSA
   b. To match clay-tile roof: Berridge Terra Cotta

4. Joints: Sealed with silicone sealant; with bayonet or hooked interlocking seams providing movement at maximum 10 feet on center.
5. Substrate: Solid with underlayment ASTM D 226-1997a Type I, No. 15, or ASTM D 4869-1988(R93) Type I asphalt saturated organic felt; minimum 1 layer, installed perpendicular to slope.
6. Fabrication and Installation per recommendations of SMACNA (ASMM) - 1993 Architectural Sheet Metal Manual.

## 6. Flat or Low-Slope Roofing - General

A. The preferred campus low slope (<3:12 pitch) roofing assembly is multi-ply modified bitumen.
   1. Cool Roofs shall not be used without permission of UTSA Facilities. The preference is to invest in roof insulation.
   2. The roofing assembly fastening to the roof deck shall avoid methods and procedures that would create thermal bridging (long fasteners, single connection through entire system, etc.)
      a. Fastening through channels of metal roof decking is not allowed.

B. The assembly design must comply with the Texas Energy Code and be submitted to SECO (a public building requirement).

C. Roof warrantees with wind exclusions above 55 mph are not acceptable to UTSA. Warrantees must reflect full wind load design parameters, in compliance with IBC and ASCE-7.

D. Steep slope roofs (>3:12) shall not be used without permission of UTSA Facilities.

E. **Roof Drainage**
   1. Provide emergency overflow drains in lieu of emergency scuppers, unless scuppers are used for decorative purposes.

## 7. Built-Up Asphalt Roofing – Historical Information

A. Typical Roofs: 4-ply fiberglass with asphalt flood coat & rock ballast with 20-year NDL warranty.

B. Special Roofs: 3-ply fiberglass with bitumen cap sheet, where:
   1. Appearance is a factor, or
   2. It is necessary to match the look of an existing roof.

C. For roofs that have kitchen or lab exhausts with grease, provide sheet metal grease capture pan on exhaust stack.

## 8. Single-Ply Membrane Roofing

A. Not allowed on UTSA campuses including, but not limited, to EPDM, TPO, PVC, TPA, PIB or Hypalon single-ply assemblies.

## 9. Sheet Metal Flashing & Trim

A. Warranty - all flashing adjoining roofs shall be warranted with the roofing. All

other flashing shall be warranted for 5 years, and any damage to building resulting from failure will be repaired to satisfaction of Owner at no additional cost.

B. Exposed Trim and Flashing: Kynar pre-finished galvalume, 24ga.

C. **Thru-wall and Concealed Flashing**

1. Stainless steel flashing to be soft annealed, finish as required for forming and performance, minimum 0.0187 inches thick.

D. **Metal Finishes**

1. Metals exposed to view shall have factory finished baked enamel fluoropolymer Kynar finish.

*Division 08*

# Openings

## 1. General

A. For renovation projects, where doors and frame are part of a fire-rated assembly, and the door will no longer be used, the door and frame will be removed, and the opening will be filled with materials to match adjacent wall construction. This generally affects doors that open into corridors.

B. **Door Heights**
   1. 7'-0" is standard for all interior and exterior doors.
   2. 8'-0" for special conditions as approved by UTSA.

## 2. Steel Doors

A. Insulated, hollow metal doors are acceptable for use at:
   1. Exterior stair exits
   2. Mechanical and utility rooms
   3. Other similar spaces

B. Type - flush panel, seamless edges, 16 gauge.

C. Exterior doors - SDI-100 Grade III, Model 3, extra heavy duty, G-90 hot-dip galvanized.
   1. Or ANSI 250.8 Level 3, ANSI 250.4 Level A (Extra Heavy Duty), G-90 hot-dip galvanized.

D. Interior doors - SDI-100 Grade III, Model 3, extra heavy duty.
   1. Or ANSI 250.8 Level 3, ANSI 250.4 Level A (Extra Heavy Duty)

E. Finish - oven-dried baked-on at factory zinc chromate primer.

## 3. Steel Door Frames

A. Type - welded, 16 gauge (0.067-inch)

B. Exterior doors - G-90 hot-dip galvanized.

C. Finish - oven-dried baked-on at factory zinc chromate primer.

D. Reinforcement - frames wider than 4 feet shall be reinforced with 12 gauge rolled formed steel channels welded in place, flush with top of frame.

## 4. Flush Wood Doors

A. Flush wood doors may be used on interior doors.

B. Warranty - life of installation.

C. Type - solid core, 1-3/4" thick

D. Glazing stops - rolled steel.

E. **Finishes:**
   1. High-pressure decorative laminate of .050-inches plastic laminate for door face and edges. Apply edge before face.
   2. Existing doors in the University Center are plastic laminate finish with Wilsonart Cloud Nebula #4630-8 color.
   3. Red oak veneer wood face, bookend-matched grain, opaque finish.

## 5. Access Doors

A. Provide lockable door to provide access to crawl spaces. Furnish key cores to UTSA Access Control representative.

## 6. Sectional Overhead Doors

A. Provide overhead doors which are galvanized, steel panel, factory primed; with torsion spring counterbalanced power operation.

B. Panel width: 12 inches

C. Tracks and Guides: Galvanized steel

D. Galvanizing: ASTM A 653/A 653M-1998 G90/Z275 or equivalent.

## 7. Aluminum Entrances & Storefronts

A. The exterior entrance and window system must be an aluminum storefront system with automatic sliding doors as the primary means of entry, and narrow-stile hinged doors as secondary means of entry.
   1. The entrance/storefront system should conserve energy as required by the State Energy Code, State Energy Compliance Office.

B. **Finish**
   1. Anodized, factory-painted aluminum

C. **Automatic Sliding Doors**

D. **Hinged Doors**
   1. Narrow stile

E. Warranty must be for 10 years.

F. **Security**
   1. Exterior doors: Main doors will be aluminum and glass automatic slider type with appropriate lock down system. Secondary doors will be outward opening with touchbars or crossbars, metal construction, 1-3/4", double cylinder locks. Glass in doors must be safety glass. Corbin-Russwin cores for all cylinders.

2. Double swinging doors, if used: one door will have a mortised header and threshold bolt that extend one inch into the frame. The other door will have a narrow style lock, with the bolt extending at least one inch. The area around the lock and strike area will be reinforced (hardened) if the doors are constructed of aluminum.
3. Security strike plates mounted with at least four, three-inch hardened-steel screws. Hingepins located on the outside will be secured using one of the following methods: Commercial hinges with non-removable pins, weld pins in place, or place set screw into hinge.
4. Frame must be secured to the surrounding studs with a minimum of eight, three inch nails or screws. Space between frame and studs will not be permitted. Studs will be blocked to prevent the door frame from being pried open.
5. Late Entry doors: Same as above plus: Electromagnetic locks. A pushbutton exit switch or touchbar system will be required to deactivate the electric lock when exiting. CCTV camera mounted in the interior or exterior of the building facing in or out as appropriate. Intercom mounted externally adjacent to the door frame. Connect to police dispatch. (ADA compliance) Card reader access (ADA compliance) Access through late entry doors will be accomplished by card reader access or by electromagnetic lock released by the police dispatch.

## 8. Door Hardware

A. New buildings should include card key access in research labs.

B. Electronic strikes shall have fail secure function. The inside trim is always unlocked to allow egress, but the lockset remains secure in a power outage.

C. **Locksets, Cylinders and Keying**
1. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
2. Approved manufacturer: Corbin Russwin
3. Approved product: ML2200 series mortised locksets with lever handle.
4. Lease space projects and other projects that do not require 50-year lifecycles: CL3800 series cylindrical lockset with NZD leverset and interchangeable core.

D. Construction cores - for interior doors only. Contractor desiring temporary construction phase building security at exterior locations shall provide and be responsible for a substitute cylinder on a temporary basis that shall be removed and supplanted by the specified proprietary high security cylinder.

E. **Closers**
1. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
2. Approved manufacturer: Corbin Russwin

3. Approved product: DC6200 series mortised locksets with lever handle.
4. Warranty - door closers shall have 5-year warranty.

F. **Hinges**
1. Hinges for all out-swinging doors shall be supplied with non-removable pins.

G. **Exit Devices**
1. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
2. Approved manufacturer: Von Duprin
3. Approved product: Series #99
4. Exit devices must be constructed as to allow the cylinder to be removed and re-keyed without removing the device from the door by removable core cylinders.
5. Exit devices used in conjunction with card reader security access control must have electric pin retraction and power transfer hinge.
    a. This lockset shall be "fail secure".

H. **Door Stops and Holders**
1. Hinge pin mounted stops are not acceptable.

I. **Electronic Mortise Lockset**
1. This lockset must combine key-in-lever design with motorized, programmable, stand-alone electronics for high security access control, which requires no external wiring. Entry shall be by UTSA Card with audit trail retrievable by preprogrammed computer software. Lockset mechanical override cylinder must be supplied keyed to owner's system.
2. This lockset shall be "fail secure".

J. **Keying**
1. University Police Access Control will coordinate keying of locks and cylinders throughout the project.
2. Keying information is proprietary and security sensitive, and as such its distribution is restricted.
3. University Police Access Control will prepare a keying schedule with bittings for proprietary key manufacture, and coordinate with supplier and Corbin/Russwin.
4. Keys and interchangeable cores will be shipped directly to the University Police Access Control.
    a. Delivery of keys by registered mail directly to University Police Access Control.
    b. Stamping: Do not stamp visual key control numbers. VKC numbers will be supplied and stamped by University Police Access Control.
        i. Notation: [DO NOT DUPLICATE], leave one side blank.
5. Construction cores are to be used until acceptance. On acceptance of

the facility, Access Control will exchange the cores.

6. Key Control System
   a. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
   b. Provide key cabinet as manufactured by Key Systems, Inc., of sufficient capacity to handle keys as specified by University Police Access Control. Must be compatible with Key Systems software.

K. **Door Viewer**

1. Viewing devices shall be installed in solid wood or metal doors that have been identified as main points of entry into an office or faculty suite.
   a. Viewing device shall be Doorscopes Model DS/1000 (ABS Plastic Model), 60 Minute Fire-rated, or approved equal.
   b. Evaluation criteria conformance with UL-10B, ASTM E 512, CAN4-S104, NFPA25A & UBC43-2
   c. Confirm viewer will not void fire-rated door warranty with door manufacturer.
   d. Provide two viewers per door: one at standard manufacturer recommended height, and the second at ADA/TAS-compliant height of 4'-0" a.f.f. to center of unit.
2. Doors with glass panels or side lights do not require viewing devices.

## 9. Glazing

A. **One-Way Mirror**

1. In order for one-way mirrors to function properly, a differential in illumination levels between the viewed side and the viewing side of 4 or 5 to 1 is required.
2. This means that unless the one side is relatively dark, the window will allow light to pass from either direction with little reflection.

B. **Window Tint**

1. UTSA uses Madico SRS-220-CSR "reflective silver" window tint (0.22 SHGC, 78% total solar energy rejected, 15% visible light transmitted, 55% visible light reflected, 99% ultraviolet rejected, 83% glare reduction).

## 10. Windows

A. Manufactured aluminum window systems – including punched windows, ribbon windows and conventionally glazed aluminum window installed as stick assemblies – are inclusive of pre-fabricated anodized aluminum windows and frames, closure members, reinforcement, shims, accessories, anchorage devices and miscellaneous fasteners, concealed and non-concealed, and flashing and trim for weather-tight system.

B. Double glazing is required on all exterior windows.

C. Institutional quality construction and superior coatings and finishes should be considered, budget permitting.

D. Window systems shall consist of commercial-grade windows unless permission is granted by UTSA Facilities for use of non-commercial grade.

E. **General**

1. Testing for water penetration (ASTM E 1105) and air infiltration (ASTM E 783)shall be performed by a qualified testing agency. Results shall be provided to UTSA Facilities.
    a. Testing shall be performed prior to installation of cladding.
2. Certification is required that new windows meet the requirements of the Steel Window Institute or Aluminum Window Institute.
3. Window detailing shall provide for drainage, weepage, flashing, etc., for a weather tight installation. Fabricated components shall have the following characteristics:
    a. Profiles that are sharp, straight, and free of defects or deformations.
    b. Accurately fitted joints with ends coped or mitered
    c. Physical and thermal isolation of glazing from framing members
    d. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances
    e. Fasteners, anchors, and connection devices that are concealed from a view to greatest extent possible
    f. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior
    g. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary sealed weeped and vented to exterior
4. Metal protection shall be provided on all window systems used.
    a. Where aluminum will contact dissimilar metals, protect against galvanic action.
    b. Where aluminum will contact concrete or masonry, protect against corrosion.
5. Glazed aluminum windows shall withstand movements of supporting structure (story drift, twist, column shortening, long-term creep, deflection, etc.) from uniformly distributed and concentrated live loads.
6. Avoid the use of film applied to exposed surfaces of glass whenever possible, unless allowed by UTSA Facilities. When allowed, refer to Section 9(B.), Window Tint for specifications.
7. Wired (safety) glass is not allowed in any application.
8. Tinted/colored glass or spectrally selective glazing shall be reviewed and approved by UTSA Facilities.

F. **Openings**

1. **Exterior Window Openings**
    a. Standard Glazing: 1" insulating units with solar control low emissivity (low-e) coating
        i. Use heat treated glass as required by thermal stress

analysis
ii. Use laminated glass for obscure or translucent glazing
b. Safety Glazing: 1" insulating glass units, where required by code, either fully tempered (FT) or laminated
c. Spandrel Glass
i. Use heat treated glass as required.
ii. Space immediately behind Spandrel glass shall be adequately vented.

2. **Interior Window Openings**
a. Standard Glazing: Annealed float or laminated
i. Use laminated glass for obscure or translucent glazing
b. Safety Glazing: where required by code, either fully tempered (FT) or laminated

3. **Fire-rated Glazing**
a. Due to high cost of installation and replacement the use of fire rated glazing should be carefully considered during the design and approved by UTSA Facilities.
i. Transparent ceramic (used as part of an insulating unit if exterior rated glazing is required).
ii. Transparent wall units designed as a barrier wall (inert material turns to foam during a fire)

4. **Specialty Glazing**
a. Coordinate approval of specialty glazing such as bullet resistant, acoustical, one way viewing, projection booths, etc. with UTSA Facilities to determine products that will meet specific needs.

G. **Warranties**
1. Manufacturer's standard: Ten (10) year warranty against material defects in manufacture including finishes and hardware failure of any kind.
a. Windows: Guaranteed to operate under any normal temperature and humidity condition for San Antonio, TX. Wind loads shall be as determined by ASCE 7 using a wind speed of 90 MPH.
b. Insulated glass: Guaranteed against seal failures causing clouding or fogging of any kind between glass for ten (10) years.
2. Contractor's warranty: Warrant aluminum windows and frames and related flashing, sealants, fasteners, and accessories against defective materials and/or workmanship to remain watertight and weatherproof with normal usage for two (2) years following substantial completion date and to repair or replace without additional cost to the Owner any leaks and resulting damage to other materials and building contents as may occur.

*Division 09*

# Finishes

## 1. General

A. Preliminary finish and material submittals are to be presented and approved prior to 95% construction documents.

B. Items that are built-in or affixed to the structural, mechanical, plumbing members of a building, or its A/V systems, fall under the design and specification responsibility of the A/E, or Design Team and are to be procured through the Construction Contract. Those items include but are not limited to:

1. Building directories, graphics, and way finding
2. Bulletin boards in public areas
3. Carpet and carpet base
4. Chalkboards and liquid writing boards in public areas
5. Cubicle curtain and tracks
6. Draperies on electrified tracks or that fit into wall or ceiling pockets
7. Exterior and interior signage
8. Fixed lighting fixtures
9. Floor to ceiling and accordion room dividers
10. Window blinds, drapery, shutters, and shades whether interior or exterior
11. Fixed furniture and furnishings

## 2. Unfinished Areas

A. Sealed Concrete Floors shall be provided at the following areas:

1. Electrical Closets

## 3. Portland Cement Plaster

A. PCP should be painted with a high-grade paint so that future maintenance can be accomplished easily.

## 4. Hard Floor Surfaces

A. Hard surface tile includes ceramic tile, clay tile and porcelain tile.

1. HST shall be provided in the following areas at the floor:
   a. Main entrances to buildings
   b. Corridors adjacent to main entrances
   c. Toilet rooms
2. HST shall be provided in the following areas at the walls:
   a. Toilet rooms

B. **Floor Finishes**

1. For all hard floor surfaces requiring a finish application of polish or wax, UTSA will provide materials, and contractor will install materials

prior to substantial completion of the project.

2. Contractor shall provide UTSA with the square footages of each different type of floor finish required no less than 8 weeks prior to the time scheduled for installation.

## 5. Resilient Tile Flooring

A. **Vinyl composition tile (VCT)**

1. VCT shall be provided in the following areas:
   a. Corridors
   b. Vending Areas
   c. Custodial Closets
   d. Labs
   e. Darkrooms
   f. Autoclave & Other Equipment Rooms
   g. Data/Comm Closets
   h. Student Offices
2. Contractor shall broom clean floors prior to acceptance by the Owner. Waxing and sealing of floor will be by Owner after acceptance of the building.

## 6. Carpet

A. The exact carpet(s) manufacturer, style name, number and color shall be specifically identified by the vendor and shall be consistent with what his bid is based.

B. The selection of carpet type(s) shall be made and guided by an informed understanding of the amount of traffic a given area will experience, the anticipated degree of spilling and staining that will occur in that area and the amount of direct sunlight exposure on the carpet(s). The following are the categories from which carpet selections shall be made:

1. **Type 1 Broadloom or Tile Carpet**
   a. For areas of high traffic subject to frequent spills and stains (health care, food service areas) and significant direct sunlight.
   b. Construction: Tufted or woven, level or multi-level loop pile with maximum height variation of 1/32 inch.
   c. 12-foot broadloom, six foot or carpet tile.
   d. 100% Invista Antron Lumena Type 6,6 solution dyed nylon or 100% Solutia Ultron SDN nylon 6,6 OR 100% Invista Antron Legacy nylon with Duracolor ® by Lees Permanent Stain Resistance System or 100% Solutia Ultron ColorShield, nylon 6,6.
   e. Pile Weight: Minimum of 17 oz/yd$^2$.
   f. NO latex backing acceptable.
2. **Type 2 Broadloom or Tile Carpet**
   a. For areas of heavy traffic where dry soiling is the primary maintenance concern.
   b. Construction: Tufted or woven, level or multi-level loop pile with maximum height variation of 1/32 inch.
   c. 12-foot broadloom, six foot or carpet tile.
   d. 100% Invista Antron Nylon, or 100% Solutia Ultron Nylon 6,6.
   e. Pile Weight: Minimum of 17 oz/yd$^2$.

f. NO latex backing acceptable.

3. **Type 3 Broadloom or Tile Carpet**
   a. For areas of low traffic subject to frequent spills and stains where significant direct sunlight, colorfastness and budget are primary concerns.
   b. Construction: tufted, level, multi-level or textured loop pile with maximum height variation of 1/16".
   c. 12-foot broadloom, six foot or carpet tile.
   d. 100% 1st quality bulk continuous filament Type 6,6 Nylon
   e. Dye method: Solution dye
   f. Pile Weight: Minimum of 17 oz/yd$^2$.
   g. NO latex backing acceptable.
4. **Carpet Tile or Six Foot Vinyl Cushion Back Rolled Goods**
   a. Construction: Textured or level loop tufted graphics.
   b. 100% Invista Antron Nylon, or 100% Solutia Ultron Nylon 6,6
   c. Dye method: 100% solution dye or a solution dye yarn dye blend
   d. NO latex backing acceptable.

C. Aluminum or vinyl edge guard or transition shall be provided at carpet edge. Color shall be suitable for installation, with attachment via mechanical fasteners or glued down.

D. **Installation**
1. Subfloors must be level, clean, dry, free of dust, dirt, wax, paint, grease, cut back adhesive or any material that could interfere with bonding strength.
2. Concrete floors must be fully cured and free of excessive moisture and alkalinity.
3. Floor covering and adhesive to be stored at a temperature of 70 degrees F for 48 hours prior to installation.
4. Do not expose adhesive to ultraviolet light.
5. Double cut edges tight to form seams without gaps.

## 7. Painting

A. **Paint colors:**
1. Wall and ceiling paint colors are to be selected by design consultant with approval by UTSA Facilities.
2. For UTSA Wordmark – PMS 294 Blue
3. For UTSA accent color – PMS 166 Orange

*Division 10*

# Specialties

## 1. Toilet Compartments

A. Type – ceiling hung phenolic.

B. Provide theft-proof hardware.

## 2. Bulletin Boards, Marker Boards & Map Rails

A. **Bulletin Boards**

1. Lockable bulletin boards shall be provided in public spaces as directed by UTSA. Public spaces might include elevator lobbies, corridors and building entrances. Lockable bulletin boards are assigned to the principal building occupants and/or departments.
2. Lockable bulletin boards shall have the following features:
   a. 4'-0" high by 6'-0" long by 3-inch depth
   b. Recess mounted standard, surface mounted where approved
   c. Factory assembled, premium fabric finished board assembly of three-ply construction consisting of fabric which is factory laminated on ¼-inch cork underlay and ¼-inch hardboard.
   d. Frame of 1-1/4 inch x 0.062 inch-thick aluminum face trim with mitered corners, black painted powdercoat finish, and concealed hangers.
   e. Two sliding 3/16" tempered glass doors with ground-in finger pulls
   f. Tumbler lock with 2 keys, each board to be keyed different
   g. Fabric color as selected from manufacturer's premium colors, with frame spread index of 25 or less and a smoke-developed index of 50 or less.
   h. Mounted at 36" above finished floor to the bottom of the board
   i. Provide an engraved plastic laminate sign rivet-attached to the top frame of the bulletin board. The sign will identify the name and phone number of the department to whom the board is assigned.
3. Open bulletin boards shall be provided in public spaces for "general posting" as directed by UTSA. Public spaces might include elevator lobbies, corridors and building entrances.
4. Open bulletin boards shall have the following features:
   a. 4'-0" high by 8'-0" long
   b. Surface mounted
   c. Factory assembled, premium fabric finished board assembly of three-ply construction consisting of fabric which is factory laminated on ¼-inch cork underlay and ¼-inch hardboard.
   d. Frame of 1-1/4 inch x 0.062 inch-thick aluminum face trim

with mitered corners, black painted powdercoat finish, and concealed hangers.

e. Fabric color as selected from manufacturer's premium colors, with frame spread index of 25 or less and a smoke-developed index of 50 or less.

f. Mounted at 36" above finished floor to the bottom of the board

g. Provide an engraved plastic laminate sign rivet-attached to the top frame of the bulletin board. The sign will identify the name and phone number of the department to whom the board is assigned.

5. Bulletin boards shall be located inside departmental space as directed by the department. Size of boards can vary, but specification should match lockable or open bulletin boards.

B. **Marker Boards**

1. Marker boards shall be provided in departmental collaboration spaces, conference rooms, etc., as directed by UTSA. Marker boards are assigned to the principal building occupants and/or departments, depending on their location. Marker boards shall have the following features:

a. 4'-0" high by 4'-0" wide (typical size).

b. Dry-erase porcelain with scratch and stain resistant surface, factory laminated assembly of three-ply construction consisting of backing sheet, 3/8-inch core material, and 24-gauge porcelain enamel steel.

c. Frame of 1-1/4 inch x 0.062 inch-thick aluminum face trim with mitered corners, black painted powdercoat finish, and concealed hangers; do not include chalk trough.

d. Color: porcelain low gloss white.

e. Warranty: Porcelain enamel face sheets shall carry manufacturer's standard 20-year warranty for the replacement of sheets that fail, including surfaces that lose original writing and erasing qualities and surfaces exhibiting crazing, cracking or flaking.

C. **Map Rails**

1. Map rails shall be an aluminum rail with mechanical mechanism full length of rail for holding paper inserted into slot, typical size 8'-0". The aluminum face trim shall have a black painted powdercoat finish, and concealed hangers.

## 3. Signs

A. **Building Identification Plaque**

1. Cast bronze building identification plaque.
2. As described in UT System Division I information.

B. Provide appropriate exterior signage and interior room signage in accordance with UTSA Signage Standards (see Appendix B)

1. All rooms in every building will be identified with signage. Where the room has more than one door, each door will have signage with a unique number.

2. All exterior doors to a building will be identified with signage, each door with a unique number.

C. Building Identification Lettering shall be in conformance with guidelines set forth in Appendix B.

D. **Stair Identification Signs**
1. Stairs shall be provided with signage within the enclosure at each floor landing.
2. Stair signage shall conform with UTSA Building Signage Standards (see Appendix B).

E. Refer to "Directories and Bulletin Boards" above, for additional signs.

F. A full-size paper sample of all graphics (including floor plans and maps) and mockups of Building Identification Lettering must be submitted for approval by UTSA prior to fabrication or installation (see Appendix B).

## 4. Fire Extinguishers, Cabinets & Accessories

A. **Typical Fire Extinguishers**
1. Extinguisher type - multi-purpose dry chemical 10 lb. capacity, 4A-60B:C, all fittings shall be brass, not aluminum.
2. Acceptable manufacturers: Amerex or Badger.
3. Extinguishers in Corridors or passageways- recessed cabinets with solid door and stainless steel trim.
   a. Cabinet box at interior spaces to be heavy gauge steel with white baked enamel finish.
   b. Cabinet box at exterior spaces that are surface-mounted shall have stainless steel door and trim, and have a box constructed entirely of 304 stainless steel with #4 finish.
4. Extinguishers inside rooms – manufacturer's standard hook bracket.
5. Type and installation of extinguishers, brackets and cabinets shall meet the most current version of NFPA as adopted by the State Fire Marshal and UT System.

B. **Fire Extinguishers at Commercial Kitchens**
1. Extinguisher type - Class K extinguisher. Size is a 6-liter extinguisher.
2. Acceptable manufacturers: Badger Fire Protection.
3. Extinguishers in Corridors or passageways - recessed cabinets with solid door and stainless steel trim. Cabinet box is to be heavy gauge steel with white baked enamel finish.
4. Extinguishers inside rooms – manufacturer's standard hook bracket.

C. **Certifications**
1. Prior to substantial completion of the project, fire extinguishers shall have inspection tags attached to the fire extinguisher, certifying that extinguisher has been inspected in the last 30 days.

D. **Fire Extinguisher Cabinets at Parking Garages**
1. Provide a cylinder lock at cabinet doors equal to Larsen's LARSEN-LOC®. This steel cam lock-based design permits opening of the

cabinet door by pulling sharply on the handle, yet secure enough to deter the vandalism.
   a. All cylinders shall be keyed alike.
   b. Provide 10 keys, engraved with "FIRE EXT. CABS."
2. Provide factory applied lettering reading: "IN CASE OF FIRE ONLY - PULL FIRMLY ON HANDLE".

## 5. Telephone Specialties

A. **Pay Telephones**

1. Pay telephones and telephone enclosures are furnished and installed by UTSA.
2. Provide rough-ins and blocking for 2 pay telephones on the main level of every building. One of the pay phones must be accessible for the use by people with disabilities and an electric outlet must be provided 24 inches above finished floor for TDD device.
3. Provide additional pay telephones only as directed on other levels.
4. The phones need to be located so that the overhang of the telephone device and of the person using the phones will not hamper/impede traffic in the adjacent corridor.
5. The phones should be located in an alcove, or wider corridor area, and should be near the main entry/lobby.
6. Signage should be used to direct occupants to pay telephones.

## 6. Hearing Assistance Notification System

A. UTSA uses Alertmaster ® Notification System as manufactured by Clarity, where required to accommodate those who have a profound hearing loss. Components include:

1. Receiver: AM 6000
2. Signalers:
   a. AMAXTM Audio Alarm Signaler, provides alerts for smoke alarms or other audio alerts
   b. AMDXTM Door Announcer, provides alerts for door knocks or doorbells.

## 7. Toilet & Bath Accessories

A. **Paper Towel Dispenser/Waste Receptacle**

1. At high traffic toilet rooms, provide 1 dispenser for every 2 lavatories.
2. At low traffic toilet rooms, provide 1 dispenser for every 4 lavatories.
3. For toilet rooms with multiple lavatories: provide Bobrick B-3961 recessed roll-paper-towel dispenser and waste receptacle (12 gallon capacity).
4. For toilet rooms with single lavatories: provide Bobrick B-2860 surface-mounted roll-paper-towel dispenser and Bobrick B-279 surface mounted waste receptacle (6.5 gallon capacity).
5. UTSA purchases rolls that are 7.87inches x 350 ft. packed 12 rolls per case. We are getting these off the state contract.

B. **Jumbo Roll Toilet Paper Dispenser** - Quantum Vision Roll Dispenser holds 13" roll and a 7" stub roll. Model # San R6500 TBK. Transparent Black

C. **Sanitary Napkin/Tampon Vending Machine** - Bobrick Model B-3500

vending should be 25 cents. (Women restrooms only.)

D. **Sanitary Napkin Disposal** - Bobrick model # B-270, surface mounted. (Women restrooms only, 1 in each stall)

E. **Baby changing stations** - Rubbermaid model # 7818-00. (All Men's and Women's public toilets.)
   1. Baby changing stations should be provided in men's and women's restroom facilities

F. **Soap Dispenser, Surface-Mounted** – IMPACT metal soap dispensers top fill. Model # Imp 4020.

G. **Soap Dispenser, Counter-Mounted** – Bobrick Contura, Mounts to 1" Diameter hole in lavatory or counter top, model # B-822.
   1. Top filling dispenser with stainless steel finish, 34 fl. Oz. (1.0 L) soap capacity and 4" spout length.

H. **Shelves:**
   1. Shelves shall be provided in toilet rooms for students/faculty/staff to place books and backpacks upon while using the facilities.
   2. The preferred option is to provide recessed shelves so that they do not encroach on the pedestrian traffic area.
   3. An acceptable alternative is to provide shelves attached to the wall.
   4. Shelve requirements for both options should be as follows:
      a. Shelves should be stainless steel.
      b. Provide. Minimum length of shelves as follows:
         - 18 inches for rooms with a single toilet
         - 36 inches for rooms with a two toilets/urinals
         - 72 inches for rooms with up to six toilets/urinals
         - 12 additional inches for each additional toilet/urinal
      c. Shelves shall be 6 inches deep, and shall hold up to 50 pounds per linear foot.
      d. For shelves that are attached to the wall, the first shelf would be mounted at 27 inches above finished floor and the second would be mounted directly above the first at 56 inches above finished floor.

I. At lavatories and sinks with knee spaces below, protect plumbing with vinyl coated insulation jackets.

## 8. Defibrillators & Cabinets

A. Automatic External Defibrillator (AED) shall be Zoll AED Plus or UTSA approved equal.

B. The AED shall be housed in a suitably-sized, cold-rolled steel sheet (type B) non-rated recessed cabinet with overlapping flush panel door.
   1. Cabinet shall be trimless with hidden flange of same metal and finish.
   2. Hardware shall be the proper type for this type of cabinet.
   3. Cabinet shall be identified with the words "Automatic External Defibrillator", letters being horizontal, black, engraved and applied to

the cabinet door.

4. Cabinet finish shall be baked enamel or powder coat.

C. Suitable framing depth and blocking shall be provided for recessed cabinet, at indicated mounting height in concurrence with UTSA.

*Division 11*

# Equipment

## 1. Window Washing Equipment

A. Special accommodations for window washing equipment are not required. Window washing is conducted using portable cranes.

## 2. Projection Screens

A. The type of projection screens to be used on each project will be determined by the departmental program requirements and budget.

B. The use of ceiling recessed models requires special support and bracing back to the structure.

## 3. Audio Video Systems

A. **General**

1. Coordination of lighting needs to be done to ensure that light fixtures at projection screens are controlled separately from balance of light fixtures in room.

B. **Rooms**

1. Computer Classrooms will not be constructed with a tiered floor design: this is not conducive to the functions of Instructional Technology

C. **Room Types Matrix** – each of the following receives A/V systems as noted:

| Room Type | Seating | Video Projector | Amplifier & Speakers | Stereo Audio | Laptop Connector | Document Camera | Combo. DVD/VCR | Video Switcher | Computer & Monitor | Lectern | Touch Screen A/V Controls | Microphone | Video Camera | Auxiliary Input Plate | Power/Data/Phone at Center | Power/Data/Phone at Perimeter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Conference* | *4* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *Y* |
| *Conference* | *6* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *Y* |
| *Conference* | *12* | *Y* | *N* | *Y* | *Y* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *N* | *Y* | *Y* | *Y* |
| *Conference* | *24* | *Y* | *Y* | *N* | *Y* | *N* | *Y* | *Y* | *N* | *N* | *N* | *N* | *N* | *Y* | *Y* | *Y* |
| *Conference* | *> 24* | *Y* | *Y* | *N* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *N* | *N* | *Y* | *Y* | *Y* | *Y* |
| *Classroom* | *All* | *Y* | *Y* | *N* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *N* | *N* | *Y* | *Y* | *Y* | *Y* |
| *Lecture Hall* | *All* | *Y* | *Y* | *N* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *N* | *N* | *Y* | *Y* | *Y* | *Y* |
| *Video Conf.* | *< 24* | *Y* | *N* | *Y* | *Y* | *Y* | *Y* | *Y* | *N* | *N* | *N* | *Y* | *Y* | *Y* | *Y* | *Y* |
| *Video Conf.* | *> 24* | *Y* | *Y* | *N* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* |
| *Dist. Learn. Class* | *All* | *Y* | *Y* | *N* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* | *Y* |

D. **Video Projector**

1. Include a composite video cable between wall plate and projector for video.
2. While high pixel resolution is always desired, the native resolution of the projectors is 1024x768 (786,462 pixels). The projector will accommodate higher resolutions but will not give a true representation. Additionally, since many rooms will be used for video conferencing, the definition of the video signal will be further degraded when using standard television signals. Install a unit with 850,000-pixel resolution.
3. Acceptable Products:
   a. Epson ELDPC05
   b. Wolf VZ-9
   c. or equivalent
4. The standard projector mounting bracket for use in false ceiling applications shall be Model #CMA450 manufactured by Chief (or UTSA-approved equal).
5. Viewing angle from any student seat in teaching spaces shall be a maximum of 45-degrees from centerline of screen.
6. Provide associated ceiling recessed electric projection screen.
7. Alternative installations can be flat screen monitors or Smart Boards.

E. **Amplifier and Speakers** (in teaching spaces requiring audio amplification)

1. A 30-watt mixer/amplifier and wall speakers for sound.

F. **Stereo Audio**

1. Use the projectors' built in 2-watt speakers system.

G. **Laptop Computer**

1. Provide for connectivity of a personal computer, laptop, or auxiliary audio and video sources. Route the sources to the appropriate switcher.

H. **Document Camera**

I. **Combination DVD/VCR**

1. Use a combination DVD/VCR player that can play both media.
2. Acceptable Products:
   a. Sony
   b. JVC
   c. or equivalent

J. **Video Switcher**

1. Use a router to direct sources to the projector. Using a router to send XGA, S-video, and composite to the codec as well as the projectors. Install a video switcher to route signals to the projector and control the source selection through the room control system.
2. Extron Electronics makes several units that are RS-232 controllable.

K. **Computer and Monitor**

L. **Lectern** – adjustable height for ADA compliance

M. **Touch-Screen A/V Controls**

N. **Microphone** (in teaching spaces requiring audio amplification)

O. **Video Camera**

P. **Auxiliary Input Plate**

1. Provide an auxiliary input plate with a RGB, data, and auxiliary audio and video inputs. Route the sources to the appropriate switcher.

Q. **Power/Data/Phone at Center**

1. Provide power receptacle, computer data receptacle and telephone receptacle at center of room in floor box. This will allow the most flexibility of design.

R. **Power/Data/Phone at Perimeter**

1. Provide power receptacle, computer data receptacle and telephone receptacle at perimeter of room at wall in location so that pedestrian traffic in/out of room will not cross cables extended from this wall to the conference table.

S. **Cable TV**

1. Currently, Time Warner Cable provides cable TV service to UTSA over Time Warner Cable provided lines. This is not an exclusive provider agreement.
2. Grande Cable TV is also available in the UTSA area.
3. All main buildings have cable on at least the 1st floor level. Current drops include:
   a. JPL - 9 drops
   b. MS - 12 drops
   c. Elsewhere - 12 drops
4. For new major building projects, provide pathway to extend cable TV into building and adjacent to each Data/Telecom closet on each floor. Cables and equipment are not part of the project.

T. **Assistive Listening Systems** (in teaching spaces requiring audio amplification)

1. Signage associated with the system shall comply with TAS 703.5 and 703.7.2.4

## 4. Laboratory Casework & Equipment

A. **Laboratory Design**

1. Lab spaces for which a researcher has been identified shall be designed to conform to the requirements of the researcher.
2. Lab spaces for which a researcher has not been identified shall be designed to conform to the requirements for a generic lab of the type for which the building (or level of the building) is allocated.
3. For generic lab space, the Construction documents base bid will be designed as shell space; as an alternate bid item, on a per-lab basis. (e.g., Alternate Bid No. 3a will be for the completion of Generic Lab/1.234. Alternate Bid No. 3b will be for the completion of Generic

Lab/2.876, etc.), so that UTSA can pick-and-choose which generic lab will be finished out as part of the construction project. The alternates should be structured so that the price for completing the lab is based on:

a. A separate contract substantial completion date (i.e., completion of alternate bid lab space will not impact the original substantial completion of the project)
b. Acceptance of the alternate will happen within 120 calendar days after bid opening. (Note: Since alternates are bid separately, negotiation of individual labs after the 120 calendar day limit is possible, but cost can be expected to be much higher and time can be expected to be much longer.)

4. The design of the lab total capacities for fume hoods and exhaust shall be well documented and included in the drawings and specifications for future reference. All labs shall be designed with excess capacity to allow for future renovations that might include an increase to the number of hoods provided in the original design.
5. In conformance with the secondary containment requirements of the Edwards Aquifer Authority (EAA), all fume hood storage areas shall be provided with high density polyethylene (HDPE) corrosion-resistant utility lab trays. The trays need to fit to size in the storage area shelves, and the tray lip shall not exceed 1" in height. This includes flammable and corrosives storage.
6. Shell space for a generic lab will include the following features:
   a. Install partitions consisting of metal studs and insulation at walls separating the generic lab from other finished space. Gypsum wallboard will be installed on the side of the partition at the adjacent finished space.
   b. Install partitions consisting of metal studs and insulation at walls separating the generic lab from the corridor, including the alcove and door opening for typical lab design. Gypsum wallboard will be installed on the corridor side of the partition.
   c. Install a standard lab door and frame (pair of doors), located at the alcove on the corridor, with standard lever-set card-key access
   d. Floor finishes will not be installed.
   e. Suspended acoustical ceiling grid and tiles will not be installed. Install hanger wires in entire area for future installation of grid.
   f. Mechanical, electrical, plumbing, special system main lines will be provided overhead and below floor for future completion of lab. Provide appropriate cut-off-valves and cap open ends, to allow extension of utilities with minimum disruption to surrounding spaces. All utilities shall be identified with signage.
   g. Design of rooftop exhaust fan capacities should include the maximum load anticipated for generic lab space. Install dual duct constant air volume box with hot and cold ducts. Install VAV box, with capped supply and return air openings.
   h. Install electrical panels with surge protection in corridor alcove, with full complement of circuit breakers.
   i. Install hanger rods at 8'-0" centers for support of future equipment and materials

j. Install window coverings
k. Provide a single 4-foot long bare-bulb fluorescent light fixture with switch mounted adjacent to door opening. .
l. Provide sufficient emergency lighting in all shell space.
m. Provide directional exit signage and fire alarm devices as required by code.

7. If in the course of design a new researcher is hired, an evaluation of his needs and their adaptability to a generic lab will be investigated. If it is found that no additional changes are required, the design will proceed unchanged. If changes are required, FP&D will request that OFPC authorize additional A/E services to modify the design.
8. If in the course of construction a new researcher is hired, an evaluation of his needs and their adaptability to a generic lab will be investigated. If it is found that no additional changes are required, FP&D will request that OFPC accept the Alternate Bid item for the lab space. If changes are required, FP&D may request that OFPC authorize additional A/E services to modify the design.

## 5. Copy Machines – Pay-for-Use

A. In major buildings, UTSA will install a minimum of 2 public "pay-to-use" copiers. The copiers will be used in high-traffic public areas. This is owner furnished and installed equipment.

B. Power (110V) and data are required at each.

C. Size of the copier equipment with required working clearances at sides and rear is 60"W x 32"D.

## 6. Vending Machines

A. In major buildings, UTSA will install vending machines of various types and sizes. The machines will be used in high-traffic public areas. This is owner furnished and installed equipment.

B. Power (110V) and data are required at each. One data drop is required per machine. Water is required at coffee machines.

C. Size of the vending machines is generally 39”W x 34"D x 80”H for soft drinks, 50”W x 32”D x 72”H for candy machines, 38”W x 35”D x 72”H for coffee machines.

## 7. UTSA Cable Television Cabinet

A. In major buildings, UTSA will install UTSA cable televisions in wood cabinets. The machines will be used in high-traffic public areas. This is owner furnished and installed equipment.

B. Power (110V) and a duplex box for audio and video cables are required at each.

C. Size of the cabinet is 33”W x 27"D x 91”H.

## 8. Student Computer Kiosks

A. In major buildings, UTSA will install student computer kiosks in wood cabinets. The machines will be used in high-traffic public areas. This is owner furnished and installed equipment.

B. Power (110V) duplex receptacle and one data drop are required at each.

C. Size of the cabinet is 24”W x 35"D x 70”H, with 11”D keyboard in extended position.

## 9. Value Stations

A. In select buildings, UTSA will install Value Stations. The machines allow users (typically students) to add value to their UTSA Card. This is owner furnished and installed equipment.

B. Power (110V, unswitched, dedicated) and data are required at each. Refer to detail for additional information. Boxes to be aligned vertically between 12” – 24” A.F.F.

C. Size of the cabinet is 23”W x 18"D x 59”H, with 4” maintenance clearance on left side and 22” maintenance clearance on right side.

## 10. Laundry Controller

A. In buildings with pay-for-use washer and dryers (typically student housing), UTSA will install 1 laundry controller for each 16 machines (washers and/or dryers). This is owner furnished and installed equipment.

B. Power (110V, dedicated, unswitched) and data are required at each controller location. Refer to detail for additional information.

C. Size of the unit is 12”W x 4"D x 10”H, mounted at 48” AFF to centerline of unit.

*Division 12*

# Furnishings

## 1. Laboratory Casework & Fixtures

A. Do not make ADA accommodations in research labs. In case faculty becomes disabled or faculty is hired that is disabled, UTSA will make the accommodations when needed. Design labs so that they could be changed in the future. ADA accommodations tend to inconvenience the "Non-disabled" and any special counter, sink and fume hood heights and adjustments could hinder the researcher's performance and safety, especially if there is only one sink and/or hood in their lab and it has to be made accessible.

## 2. Horizontal Louver Blinds

A. **Room Darkening Blinds** – 1" slats, Hunter Douglas De-Light or Levolor Light Master, color to match standard blinds.

B. **Standard Blinds** – 1" wide metal slats, .008 inch thick spring tempered pre-finished aluminum horizontal slats with radiused corners. Acceptable manufacturers – Hunter Douglas, Levolor

## 3. Floor Mats & Frames

A. Recessed floor mats and frames are not allowed.

B. Replaceable floor mats are provided and maintained by housekeeping.

1. Standard size is 4' x 6'.

## 4. Black Out Shades & Laser Curtains

A. Black out shades and laser curtains shall be utilized appropriately when requested, per manufacturer recommended applications.

1. Laser curtains shall be selected per the specifications of the laser to be housed in the corresponding laboratory space. The A/E firm shall coordinate these design efforts with UTSA Environmental Health & Safety Laser Lab Safety Officer.
2. In laser labs, black out shades shall be provided at all windows behind laser curtains to allow flexibility in controlling the intrusion of exterior light. Black out shades do not supersede the use of laser curtains in these spaces.
3. Appropriate interlocking, alarms, shunts, etc., shall be provided with laser curtains to provide a complete protection system.

*Division 13*

# Special Construction

## 1. Environmental Rooms

A. **Construction**

1. Material: Interior and exterior material shall be .040 inch thick patterned aluminum and interior shall be stainless steel with sections fabricated to prevent any thermo-bridge contact from inner to outer surface.
2. Floor: Un-insulated floor shall be reinforced for extra bearing strength with 14 gauge, galvanized steel. Insulated floor shall be stainless steel.
3. Insulation: To be rigid urethane, foamed-in-place to integrate foam and skins into rigid panels.
4. **Doors**
   a. Provide a minimum clear opening of 34" x 78" with doors opening outward.
   b. Gaskets to be extruded polyvinyl chloride, NSF approved and resistant to oil, fats and sunlight.
   c. Hardware shall be chrome plated, positive latching - safety type complete with cylinder lock. Hinges to be polished aluminum strap type and pins to be stainless steel with self-closing nylon cams.
   d. Anti-sweat heaters to be provided on all doors of rooms having operating temperature range of 0°C or below to prevent frost accumulation. Heat tape with insulation over heat tape required on all water, drain and waste lines.
   e. Nonconductive vinyl extrusion (breaker strip) to be provided on interior framing of door section to prevent transfer of heat or cold.
5. All ceilings and exterior walls shall be finished in a white epoxy enamel finish.
6. Drain lines shall be copper.
7. **Assembly**
   a. Panel-to-panel connections shall be jointed with both gaskets and ½" diameter continuous bead of butyl caulk.
      i. Ceiling-to-wall joint to also include a bead of silicone sealant at interior of room.
   b. All penetrations to be sealed with silicone sealant on interior, spray foam insulation materials on exterior and topped with silicone.
   c. Pipe insulation shall remain continuous through insulated panel of room.
   d. Evaporator coils shall be supported on a unistrut hanger bracket assembly bridged across minimum of two ceiling panel joints.

e. Flexible elastomeric insulation shall be sealed to room ceiling panel and sprinkler pipe at fire sprinkler penetration.

B. **Instruments and Control System**

1. All instruments, controls, and major electrical components shall be located in a control console next to the strike side of entrance door.
2. The main temperature controller shall be fully calibrated, solid state, electronic control, utilizing bridge type circuit with thermistor sensor.
3. Visible and audible alarm systems are to be circuited with limit controls to indicate that a temperature condition has occurred which has exceeded the high and low limit control setting.

C. Lighting systems shall utilize cool white, 40W rapid start type fluorescent lamps. Lamps and ballasts to be enclosed in vapor proof fixtures.

D. The central conditioning equipment is to be separated from the environmental compartment by a positive pressure plenum system.

E. All electrical components utilized within each room shall be Underwriter's Laboratories approved with interior wiring practices in accordance with Underwriter's Laboratories and the National Electrical Code. Conductors to conform to Article 310 of the National Electrical Code and all motors, motor circuits and controllers to conform to Article 430 of the National Electrical Code.

F. The room shall be fully integrated into the campus voice and data infrastructure, with penetrations to be determined by UTSA.

G. Controlled humidification system: Rooms having humidity up to 98% will be furnished with clean steam type humidifiers to environmental rooms. Rooms with humidity up to 90% will be furnished with centrifugal atomizer type humidifiers. Both types of humidity systems are to be controlled by an electronic controller with a humidity range of 10% to 100%. Control of humidity for humidified rooms will be as limited by a 40°F minimum dew point +/- 5% RH.

H. Testing: Rooms shall be completely tested after installation to ensure compliance to the specified operating requirements of the room.

I. Control system manufacturers shall be Nor-Lake or UTSA-approved equal.

## 2. Roof Tie-Off Points

A. Tie-off points are required at all roof structures to allow personnel to work within 6' of a roof edge or on any other elevated surface that would require fall protection.

*Division 14*

# Conveying Systems

## 1. Elevators

A. **General**

1. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
2. Approved manufacturer: Thyssen Krupp (formerly known at Dover).
3. In lieu of a standard telephone handset communications device, use the Stentofon/Zenitel intercoms, as noted in the Security specifications.
4. Key Requirements
   a. Elevator Master Key - Illinois Key Way FP
   b. Independent Service Key (On/Off Switch) - Illinois Key Way J205
   c. Elevator Fire Service - Illinois Key Way J217
   d. Elevator Fan/Lights - Illinois Key Way J220
5. **Engraved Sign**
   a. Install sign inside each elevator cab, above control panel.
   b. Sign shall be engraved plastic, either black or brown, depending on the interior color of the elevator, and engraved with white lettering.
   c. Sign shall be attached with silicone sealant.
   d. Sign shall have ¼" high text, and shall read as follows:

*This Elevator is Regulated by the*
*Texas Department of Licensing and Regulation*
*Phone No.: 1-800-803-9202*

*Contact UTSA Work Control*
*Phone No.: 458-4262*

*Certificates of Compliance are Located*
*at the Utility Operations Building*
*Utility Operations Leaders Office 1.104A*

B. **Elevator Cabinets**

1. Cab: Steel shell with a brushed stainless steel finish and applied vertical laminate panels (laminate to be selected by design consultant with UTSA approval). Model: Thyssen Krupp TKAP or approved equal.
2. Doors: Formed metal, Stainless steel.
3. Reveals, Base, Frieze: Stainless steel.
4. Sill: Nickel Silver.
5. Front Return: Column Type Swing Return, brushed stainless steel

6. Ceiling: Island Type with particleboard core faced with polished or bright stainless steel and halogen down lights.
7. Handrail: 1-1/2" diameter continuous cylindrical brushed stainless steel with end returned to wall.

C. Elevator equipment shall be located in an elevator equipment room, and shall be accessible for maintenance from a floor level.
1. Machine room-less elevator equipment shall not be specified at UTSA.

*Division 21*

# Fire Suppression

## 1. General

A. **Design of Laboratories**

1. All teaching and research labs should be designed with a Lab Unit Fire Hazard Class "C" rating.

B. **Fire Sprinkler Systems at Electronic Equipment Rooms**

1. Electronic equipment rooms include rooms used for data systems, telephone systems, security systems and audio-visual systems.
2. On the Fire Protection Drawings, a note needs to be added at all electronic equipment rooms that reads "*INSTALLATION OF FIRE SPRINKLER HEADS AND PIPING MUST BE COORDINATED WITH OWNERS EQUIPMENT LAYOUT SO THAT HEADS AND PIPING ARE LOCATED ABOVE WALKWAY ISLES, NOT EQUIPMENT.*"

C. **Fire Sprinkler System Flushing**

1. Flushing of the fire sprinkler system is a mandatory requirement of UTSA prior to acceptance of all projects where this system is installed new. The testing protocol shall follow as indicated:
   a. The project engineer shall develop the fire sprinkler system flushing procedure per NFPA 25.
   b. UTSA Facilities will provide the procedure to UTSA EHS&RM (Safety) at least 4 weeks prior to the date of the flushing.
   c. UTSA EHS&RM (Safety) will approve or disapprove the flushing procedure at least 2 weeks prior to the date of the flushing.
   d. UTSA Facilities will provide at least 72 hours notice to UTSA EHS&RM (Safety) of the commencement of the flushing.
   e. UTSA EHS&RM (Safety) will attend the flushing and approve or disapprove the flush immediately upon its completion.

## 2. Fire Sprinkler Systems

A. **Inspections and Testing**

1. Systems that have been tested and inspected are required to have inspection certification tags installed prior to substantial completion. Technical data (hydraulic data) plate shall be attached to standpipe.
2. Fire sprinkler heads must be protected by temporary coverings to prevent construction debris from fouling the sprinkler device. Temporary protection must remain in place from the time heads are installed until substantial completion.
   a. NFPA 13, (6.2.6.2.2) states the following: Where sprinklers have had paint applied by other than the sprinkler

manufacturer, they shall be replaced with new listed sprinklers of the same characteristics, including orifice size, thermal response, and water distribution.

*Division 22*

# Plumbing

## 1. Plumbing Piping

A. Location of cleanouts, valve boxes, etc., should be coordinated so that they do not end up in walkways adjacent to building.

B. Provide isolation valves for domestic and hot water systems to isolate the system as follows:
   1. any single toilet room
   2. any single floor
   3. any single building

C. Prior to acceptance of the hot water system UTSA's water treatment consultant will do a microbial culture on to ensure it is bacteria free. Before the microbial culture is taken, the entire cold and hot water piping systems, with attached equipment, shall be thoroughly sterilized and disinfected via chlorination process as described in the American Water Work Act Standard for Disinfecting Water Mains.
   1. Super-chlorinated discharge must either be sent down the sewer system or de-chlorinated to less than 0.10mg/l before discharge into the Municipal Separate Storm Sewer System (MS4) per TCEQ.
   2. Connection to water mains shall not occur until absence of bacteria is confirmed.

D. **Backflow Preventer**
   1. Provide means to by-pass main backflow preventer so that testing/servicing of main backflow can be conducted.
   2. Provide the smallest possible secondary backflow preventer for the by-pass.
   3. Backflow prevention assemblies shall be tested within 72 hours following completion of installation.
   4. Testing shall be conducted by a Texas Commission for Environmental Quality (TCEQ) licensed Backflow Prevention Assembler Tester (BPAT).
      a. Evidence of licensure shall be submitted.
   5. The supply lines and fitting for every plumbing fixture shall be installed so as to prevent backflow.
   6. The water supply connection to coffee machines, noncarbonated beverage dispensers and beverage dispensers shall be protected against backflow by a backflow preventer.
   7. Backflow preventer installation shall be performed by a licensed backflow specialist.

E. **Water Meter**

1. Read-out on meter should display units in cubic feet (CF).

**F. Natural Gas Systems**

1. All natural gas piping systems shall be designed and constructed in accordance with the Minimum Safety Standards for Natural Gas, 49 Code of Federal Regulations (CFR) Part 192.
2. Laboratory gas is not to be connected to Class II, Type A1 or A2 biological safety cabinets without the express written authorization of UTSA Environmental Health, Safety and Risk Management Office.
3. All buried metallic pipe used for natural gas distribution must be properly coated and have a cathodic protection system designed to protect the pipe in its entirety.
    a. Underground piping shall be Jeep Meter tested and inspected prior to backfilling.
4. Contractor shall submit shop drawings describing the extent of the cathodic protection system. Shop drawings shall be prepared by an experienced corrosion engineer acceptable to UTSA.
5. Contractor shall test effectiveness of cathodic protection for all pipe sections for 1 year following substantial completion of system, and shall submit record of monitoring in accordance with 49 CFR Part 192 Appendix B, Form 14.
6. Underground natural gas piping shall match existing materials at the point of connection to existing lines.
    a. Where existing materials are unknown, or of multiple materials, the preferred specification shall be schedule 40 black steel pipe, with dielectric tape wrapping, cathodic protection, JEEP meter tested and inspected prior to backfilling.

G. **Hot Water Systems**

1. Provide a check valve between water softener and boiler, to provide thermal protection for water softener resin.
2. Provide in-line check valves on the cold water supply in the ceilings at all mop sinks. In the future, soap dispensers will be hooked up to the sinks. Without the check valves, thermal heat would travel back into the cold water line and then there would be hot water in the cold water side of fixtures

H. **Water Softener Systems**

1. Provide commercial grade soft water treatment for both hot and cold water systems.

I. **Vent Pipe Sizing**

1. Vent pipe sizing design should follow the requirements of the 2003 Uniform Plumbing Code.
    a. UPC 2003, Table 7-5 Maximum Unit Load and Maximum length of Drainage and Vent Piping Chart
    b. UPC 2003, Table 7-3 Drainage Fixture Unit Values( DFU)
2. Do not use 1/2 inch sizing of pipe; go with either 2, 3, or 4 inch pipe.

J. **Plumbing at Electronic Equipment Rooms**

1. Electronic equipment rooms include rooms used for data systems,

telephone systems, security systems and audio-visual systems.

2. On the Plumbing Drawings, a note needs to be added at all electronic equipment rooms that read "*INSTALLATION OF WATER OR DRAIN LINES ABOVE OR THROUGH THIS AREA IS PROHIBITED*."
3. Provide floor drains in all electronic equipment rooms.

K. Gate valves on main lines to be neoprene coated.

L. **Tests**

1. Sewer piping that is inside the building shall have a head pressure test administered, not a flow test. This includes pipe in occupied as well as crawl spaces.
   a. Give the sewer line a head pressure test that would consist of plugging the sewer line below and filling the line with 10 feet of head pressure.
   b. Reduce the 4" cast iron pipe to 2" and then installing a hose bib at the end so that when the test is complete you can drain the line. The line can be controlled by the hose bib into a sink or floor drain below, using a garden hose.

M. **Mixing Valves**

1. UTSA has utilized Leonard mixing valves on all recent Capital Projects, in an effort to maintain uniformity on campus. Leonard's New Generation High-Low System is the base model to be used, with approved equals subject to review and approval of the O&M Plant Engineer with appropriate trade input prior to acceptance/installation.

N. **Trap Primers**

1. UTSA uses Sioux Chief trap primers on campus. Approved equals are subject to review and approval by the O&M Plant Engineer with appropriate trade input prior to acceptance/installation.
2. Discharge piping from the trap primers shall be type K soft copper. PEX piping is not allowable in this application.

O. **Water Hammer Arresters**

1. UTSA uses Sioux Chief water hammer arresters on campus. Approved equals are subject to review and approval by the O&M Plant Engineer with appropriate trade input prior to acceptance/installation.

P. Type "K" copper piping is to be used on all campus projects.

Q. All no-hub or hubless joint connections in sanitary waste, sanitary vent, or storm drain piping shall be couplings approved under FM 1680 Class 1 and rated for 15 psi working pressure.

R. All underground branch connections shall be made using a cut-in tee of materials to match the existing line, and shall have a branch valve installed as near the existing main line as possible.

S. **Medical (Lab) Gas Systems** – All medical (lab) gas system modifications and

new installations shall be:

1. Compliant with NFPA 99;
2. Performed by a properly licensed plumber with a medical gas endorsement;
    a. Evidence of plumbing license and medical gas endorsement s shall be submitted before any work is performed.
3. Shall use type K copper pipe, specifically manufactured, labeled and properly packaged for medical gas system use;
4. Shall be inspected and certified by a 3rd party cross connection control specialist.

## 2. Plumbing Fixtures

### A. Emergency Showers and Eyewashes

#### 1. General

a. For every laboratory that utilizes (or could in the future be expected to utilize) hazardous materials, as a minimum, there should be one hands free emergency eyewash located inside the lab, and one emergency shower/eyewash combination unit located within close proximity (10 seconds walking distance or 50 feet) or inside of the lab, in accordance with User requirements, and all code requirements. User requirements cannot be less than the minimum code requirements. Instrumentation labs and other similar labs should have combination emergency shower/eyewash unit located outside of lab space to prevent the potential for electrical shock.

b. In lab spaces which no hazardous materials are used, as a minimum, rough-in plumbing for future installation of emergency shower/eyewash unit.

#### 2. ADA Issues

a. Accessible emergency showers are not required in the following applications:
    i. Teaching labs that are set up to teach the use of equipment and methods of research for laboratory work.
    ii. Research labs (used by employees only) that are not used by researchers who require accommodations.

b. Accessible emergency showers are required in the following applications:
    i. Teaching labs that have hazardous materials in use.
    ii. Research labs (used by employees only) that are used by researchers who require accommodations.
    iii. On floors with multiple teaching labs that do not contain hazardous materials, at least one lab per floor should have an accessible emergency shower.

### B. Floor Drains

1. Install floor drains in all toilet rooms.
2. Where toilet rooms have toilet partitions, locate floor drains below partition.
3. Provide floor drains in all electronic equipment rooms.
4. Associated horizontal drainage piping must fall towards the waste-

disposal site with slopes as indicated below:

a. 2-1/2" diameter pipe or less - 1/4" per foot slope
b. 3" to 6" diameter pipe - 1/8" per foot slope
c. 8" diameter pipe or greater - 1/16" per foot slope

C. **Hose Bibs**

1. Hose bibs should be provided for use in maintaining exterior building areas, especially by use of a portable power washer.
2. Hose bibs should be provided at landscape areas that are not provided with automatic irrigation systems.
3. Provide hose bibs at exterior of building within 50 feet of the following areas:
   a. Concrete walks and plazas adjacent to buildings.
   b. Dumpster areas.
   c. Landscape areas that do not have automatic irrigation systems.
4. Provide hose bibs at interior of building in the following areas:
   a. Interior plazas.
   b. Toilet rooms.
5. Hose bibs should have integral vacuum breaker, 3/4" hose thread outlet, 3/4" flanged female inlet, removable tee handle, and locking access door (keyed). Hose bibs shall also be freeze protected.

D. Provide service water supply to mechanical rooms and roofs with mechanical systems.

E. **Lavatory, Wall Mounted**

1. Vitreous China white finish wall mounted unit with concealed arm carrier supports. ADA compliant unit with 4" faucet centers and soap dispenser hole on right. Equal to Kohler "Kingston" model #K-2005-R.
2. Provide polished chrome faucet with 4" centers and vandal resistant aerator, equal to Chicago, and 4" wrist blades equal to Chicago.
3. At ADA accessible lavatories provide offset drain with polished chrome finish, equal to Chicago.
4. Note: this unit has a 5" high integral backsplash that will conflict with grab bars in small unisex toilet rooms. Use of Kohler "Chesapeake" will be allowed, with no soap dispenser.

F. **Lavatory, Countertop Mounted**

1. Vitreous China white finish self-rimming countertop mounted unit. ADA compliant unit with 4" faucet centers and soap dispenser hole on right. Equal to Kohler "Pennington" model #K-2196-4R.
2. Provide polished chrome faucet with 4" centers and vandal resistant aerator, equal to Chicago, and 4" wrist blades equal to Chicago.
3. At ADA accessible lavatories provide offset drain with polished chrome finish, equal to Chicago.

G. **Emergency Eyewash**

1. Countertop mounted, adjacent to sink: equal to Haws model #7612 or #7612LH.

H. **Emergency Shower/Eyewash**

1. Pedestal mounted, barrier free: equal to Haws model #8309

I. **Flushometers**

1. Where sensor operated flushometers are specified, provide flushometer equal to Sloan G2 Optima Plus Flushometer.

*Division 23*

# Heating, Ventilating & A/C

## 1. Overview

A. Division 23 of the University of Texas at San Antonio Design and Construction Standards is a comprehensive strategy for integrating UTSA buildings and mechanical equipment to create a more efficient and sustainable campus. These guidelines are meant to provide a design basis for consultants and contractors designing and constructing additions or modifications to the UTSA heating, ventilation and air conditioning systems.

B. All facilities and construction projects must conform to the latest specifications of the UT System Office of Facilities Planning and Construction (OFPC) and this Standard.

C. Refer to Section 13, below, for required Life Cycle Cost Analysis Guidelines.

D. **Applicable standards**

1. ASHRAE 15, Safety Standard for Refrigeration Systems, most current edition
2. ASHRAE 55, Thermal Environment Conditions for Human Occupancy, most current edition
3. ASHRAE 62.1, Ventilation for Acceptable Indoor Air Quality, most current edition
4. ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings, most current edition adopted by the State Energy Conservation Office (SECO).
5. ARI Standard 410, Forced-Circulation Air-Cooling and Air-Heating Coils, most current edition
6. ARI Standard 430, Central Station Air-Handling Units, most current edition
7. ARI Standard 885-98, Estimating Occupied Space Sound Levels in the Applications of Air Terminals and Air Outlets, most current edition
8. NEMA Standards MG1, Motors and Generators, most current edition
9. NFPA Standard 90A, Installation of Air Conditioning and Ventilation Systems, most current edition
10. ASME B31.9, Pressure Piping, most current edition
11. OSHA 3074, Hearing Conservation, most current edition

## 2. Design Conditions

A. Outdoor design conditions shall be as follows:

1. Summer Design: 100˚F dry bulb with a 74.6 mean coincident wet bulb.
2. Dehumidification Design: 82.4°F DB, 77.1°F dew point.
3. Winter Design: 20˚F dry bulb.

B. Generally, indoor design temperature for general spaces shall be maintained at 74˚F in the summer and 68˚F in the winter with a relative humidity of no more than 60%. Coordinate desired indoor conditions for laboratories or other specialized spaces with UTSA Facilities.

C. Chilled water shall be used for cooling and dehumidification. For exact pressures available at point of connection consult with UTSA Facilities' flow model.
   1. Supply/Return Temperature: 39˚F/54°F

D. Heating hot water shall be used for space heating. Conditions in the distribution system are provided below. For exact pressures at point of connection consult with UTSA Facilities' flow model.
   1. Supply/Return Temperature: 180˚F/135°F
   2. If connection to hot water distribution system is agreed to not be viable (cost evaluation to be coordinated with UTSA Facilities), steam service may be available.
      a. System supply pressure : 90-125 psig
      b. Steam to be used with shell & tube type steam-to-heating-hot-water heat exchangers at building service entrance/mechanical room.

E. For all centrally distributed systems, consult with UTSA Facilities for seasonal adjustments to the conditions above or set back strategies that should be planned for. For instance, campus CHW supply temp may be reset up to 45°F when ambient temperature and humidity conditions allow.

F. Refer to Section 10, below, for connection configuration.

G. **Data/Tel and Security Equipment Closets**
   1. Provide 24-hour space conditioning, 365 days per year. Coordinate with UTSA Facilities for stand-by power requirements on HVAC equipment.
   2. Temperature must remain constant within the range of 70 degrees (± 3 degrees) between finished floor and 9 feet AFF.
   3. Relative humidity must be maintained between 50% and 60% between finished floor and 9 feet AFF.
   4. Systems shall be zoned separately from main HVAC system to allow for overall building temperature setbacks independent of service to Data/Tel and security equipment closets

## 3. General

A. **Energy Performance Requirements**
   1. Mechanical systems shall exceed the minimum requirements of the most current edition of ASHRAE 90.1 by 5%.
   2. Minimum SECO Energy Compliance and ASHRAE performance listed above shall both be proven by a whole building simulation using approved modeling techniques and software as described in the ASHRAE 90.1 appendices.
   3. In the absence of actual data from the architectural plans or building program, HVAC load calculations for energy modeling shall follow the

guidelines in Section 10, below.

B. **Contractor License Requirements**

1. Work of this division related to HVAC shall be performed by a firm engaged in the business of heating/ventilation/air conditioning, and under the supervision of a Class A Licensed Air Conditioning Contractor, as defined by the State of Texas Department of Licensing and Regulation (TDLR).

C. **Crawlspaces**

1. Where possible, crawlspaces should be provided below buildings where extensive mechanical/electrical/plumbing systems extend below the lowest occupied floor level.
2. Where possible, crawlspace should be accessed at grade. Crawlspaces should have multiple points of entry/exit to improve safety.
3. Where at-grade access is not possible, provide access from floor level above. Ships ladders extending to a concrete pad at the crawlspace level is appropriate. Provide safety chains at unprotected openings.
4. Where at-grade access is not possible, providing a means for hoisting materials in/out of the crawlspace is required. At the level above the crawlspace, an "I" bolt capable of carrying 2,000 pounds should be provided at minor access points. At one major access point, an "I" beam with trolley capable of carrying 4,000 pounds should be provided.
5. Provide a minimum of 6-foot high by 3-foot wide clearance along and adjacent to the route of all equipment, piping and ductwork. This clearance also needs to extend to the Crawlspace access points. This clearance is for maintenance personnel access.
6. Provide a minimum of 3-foot wide clearance on all sides and below equipment, piping and ductwork. This clearance is for working on equipment, piping and ductwork. (The 3-foot wide personnel access and the 3-foot wide equipment clearance can overlap.)
7. Provide a minimum of 10-foot by 10-foot clear space, 6-foot high, below all access points into the crawlspace. Consolidation of routes for piping and ductwork needs to be investigated.
8. Provide sump pumps (more than 1) to ensure water buildup is removed through the storm sewer system. Provide alarm points at sump pumps that will tie into the energy management system (EMS).
9. Provide mechanical exhaust for air ventilation at 0.02 CFM/SF. Arrange exhaust and make-up locations to sweep air across crawl space.
10. All valves/cut-offs shall be right-handed.

D. **Pipe Cleaning and Painting**

1. All equipment, piping, conduit, ductwork, grilles, insulation, etc., furnished and installed in exposed areas shall be cleaned, prepared and painted.
    a. Copper, galvanized metal, stainless steel, fiberglass, PVC and PVDF shall not be painted.
    b. Painting shall be per the UT System's Standard Color Schedule for machinery spaces using Pratt and Lambert, Inc.'s "Effector" enamel as below:

| ITEM | COLOR | "P & L" PAINT NO. |
|---|---|---|
| Equipment Bases | Light Green | YG493M (Winter Pearl) |
| Equipment | Green | YG511Y (Biscay Green) |
| Piping (Insulated & Uninsulated) | Light Gray | B798M (London Fog) |
| Steam Piping | White Aqua | |
| Hanger Rods | Light Gray | B798M (London Fog) |
| Steam Traps & Metal Exposed to High Temperatures | Light Gray | B798M (London Fog) |
| Atmospheric Relief Lines | Light Gray | B798M (London Fog) |
| Ductwork, AHU, Fans, Insulation | Buff | Y354M (Tawny Gold) |
| Valve Hand Wheels | Blue | B726M (Siam Blue) |
| Pump Couplings & Fuel Gas Piping (including Natural Gas, LPG, etc.) | Safety Yellow | Y361M (Daisy Yellow) |
| Fire Protection Equip. & Piping | Safety Red | R131R (Vibrant Red) |

c. Aluminum jacketing on insulation and nameplates on equipment shall not be painted.

2. All uncovered steel pipe, supports, exposed pipe and hanger rod threads, and hangers in underfloor spaces shall be cleaned and painted with two coats of Tropical Paint Co. No. 77-black asphaltic emulsion.
3. Exposed condenser water piping within 20' of cooling towers should be treated with Tnemec Protective coating system or approved equal.
   a. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning. A minimum angular profile of 2.0 to 2.5 mils as per ASTM D 4417, Method C.
   b. 1st Coat (Shop or Field Applied): Tnemec Series 90-97 Tnemec-Zinc applied at 2.5 to 3.5 dry mils. Thin only with approved thinner, Tnemec 41-2 or 41-3 Thinner.
   c. 2nd Coat: Tnemec Series N69-Color Hi-Build Epoxoline II applied at 4.0 to 6.0 dry mils. Thin only with approved thinner, Tnemec 41-4 Thinner. (Two coats may be required if applied by roller.)
   d. 3rd Coat: Tnemec Series 290-Color CRU applied at 2.0 to 3.0 dry mils. Thin only with approved Thinner, Tnemec 41-39 Thinner.
4. All fuel piping (natural gas, LPG, etc.) and all fire protection piping shall be painted whether concealed or exposed, in all areas of the project without exception.

E. **Equipment Numbering and Labels**

1. Air handling units (AHUs) will be numbered sequentially 1 through X, as directed by UTSA Facilities.
2. Humidifiers should be labeled to correspond with AHU number, e.g., humidifier in AHU-86 should be HU-86.
3. All other mechanical equipment (including VAVs) shall be labeled to correspond with its associated air handling unit or system, e.g., VAV-1-1, VAV-1-2, etc. where the first number is the AHU and the second number is the VAV unit number.
4. For round piping and ductwork, locate labels at the ~~2:00~~ 4:00 or ~~10:00~~ 8:00 position on the pipe (12:00 is straight up) and on the side that is away from the primary entry into each room, so that the label would be viewable from the floor. If the pipe is up against the wall or some other obstruction, then the label should be located on the side away from the

wall or obstruction.

5. For square ductwork, locate labels on the side of the ductwork, at the top edge, and on the side that is away from the primary entry into each room, so that the label would be viewable from the floor. If the duct is up against the wall or any other obstruction, then the label should be located on the side away from the wall or obstruction.

## 4. Equipment

### A. General

1. All equipment shall be designed to meet the minimum efficiencies listed in the latest version of ASHRAE 90.1 with systems providing efficiencies 15% better than ASHRAE 90.1.
2. When adding capacity to existing systems, verify all conditions and applicable design criteria to ensure overall stable system operation.
3. Vendors shall perform a certified start up of each piece of equipment.
4. Vendors shall provide training and troubleshooting course of not less than four hours on UTSA's premises. Coordinate further project specific training requirements for major equipment with UTSA Facilities.
5. Onsite training shall be videoed with hardcopies provided to UTSA.
6. Vendors shall supply computer based training in addition to the onsite training.
7. Equipment warranties shall be 2 years from date of substantial completion.
8. Manufacturers shall provide toll free technical support.
9. Factory certified service technicians shall be available for emergency service within 4 hours of notice from UTSA.

### B. Chillers

1. Performance Requirements
   a. All chillers must be capable of operating within the design conditions listed in these design guidelines.
      i. The chilled water side shall be designed to meet capacity and operate efficiently at both a 15°F and 12°F delta T while delivering 39°F supply water.
      ii. The condenser water side shall be designed to operate at a flow rate of 3 GPM/ton with 85°F-95°F range.
   b. Chiller vessel pressure class shall be #150.
   c. Minimum evaporator flow to be rated at 35% of design flow and design temperature conditions.

### C. Boilers

1. Performance Requirements
   a. All boilers must be capable of operating within the design conditions listed in these design guidelines.
      i. Hot water boilers shall be selected at 180°F supply temperature with a blended return temperature of 160°F. Campus hot water is distributed at 180°F with a design return temperature of 135°F.
   b. All new or replaced boilers shall be provided with automatic blowdown routed to blowdown tank.

D. **Pumps**

1. Preferred Types
    a. In thermal energy plants – horizontal split case
    b. In buildings – vertical inline or end suction
2. Performance Requirements
    a. Pumps located in TEP-1 and TEP-2 shall have a pressure rating appropriate for worst case system operation. Verify with UTSA Facilities.
    b. Pumps must be selected as close as possible to the maximum efficiency point with a minimum design efficiency of 80% unless approved by UTSA Facilities. For variable flow applications, pumps shall also maintain stable operation down to 25% speed.

E. **Air Handling Units**

1. Air-side economizer required for all AHU systems unless deemed cost ineffective by an LCC analysis. Systems shall provide a means to relieve excess outdoor air during economizer operation to avoid building over pressurization.
2. Provide airflow measurement on minimum outside air stream. Separate ducts for minimum outside air and economizer air are preferred to ensure measurement accuracy.
3. If fan inlet flow measuring devices are utilized, potential pressure loss and turbulence must be coordinated with fan manufacturer and accounted for by Design Engineer.
4. AHU Fans shall be selected to not overload at any point on the operating curve and to operate with a minimum design point efficiency of 75% unless approved by UTSA Facilities.
5. Refer to OFPC specifications for minimum filtration requirements and maximum allowable coil rows and fin spacing.
6. Select coils to achieve the design leaving air temperature and total capacity as well as operate stably at the anticipated minimum capacity.

F. **Motors**

1. Generally, motors should be selected at 1,750 rpm
2. Specify NEMA Premium Efficiency motors for all applications.

G. **Terminal Air Units/Variable Air Volume Boxes**

1. Installation Notes
    a. Provide a minimum of two (2) feet access in front of control enclosure.
    b. Units are not to be mounted upside down. The bottom access panel shall remain on bottom. Coordinate and supply cold duct for left or right hand.
2. Design Notes
    a. Electronic equipment rooms include rooms used for data systems, telephone systems, security systems and audio-visual systems.
    b. Do not design terminal air units or variable air volume boxes to be installed in electronic equipment rooms.
    c. On the Mechanical Drawings, a note needs to be added at all

electronic equipment rooms that read "*INSTALLATION OF CONDENSATE LINES OR HYDRONIC PIPING ABOVE OR THROUGH THIS AREA IS PROHIBITED.*"

H. **Air Conditioning Vacuum Pumps**

1. Nash is an approved manufacturer.

## 5. Variable Speed Drives

A. **Approved System**

1. Use ABB, Yaskawa or approved equal variable speed drives.

B. **General**

1. All variable frequency drives (VFD) shall be supplied by one manufacturer.
2. All manufacturers shall have a minimum history of 10 years producing VFDs.
3. VFDs shall incorporate the use of a pulse width modulated (PWM) inverter, and insulated gate bipolar transistors (IGBT) designed for control of standard NEMA design B induction motor.
4. VFDs that service critical equipment (verify each service point as critical or not critical with UTSA Facilities) shall be supplied with a bypass unit. VFD and bypass shall be UL listed as complete assembly.
5. Bypass units shall incorporate a 2 contactor and disconnect switch design. The disconnect shall allow for the safe troubleshooting or replacement of the drive unit while the motor is running in bypass mode.
6. VFDs shall have harmonic reduction built-in, minimum 12-pulse or equivalent harmonic distortion for motors <100 HP and 18-pulse or equivalent for motors > and equal to100 HP.
7. VFDs shall have a NEMA rated enclosure suitable for installation location.
8. Comprehensive manufacturer's training shall be provided for VFDs.
9. VFDs shall be equipped with a removable keypad, capable of remote operation.
10. VFDs shall be supplied with transient voltage protection.
11. VFDs shall be capable of reducing motor noise.

C. **Control**

1. VFD shall have an RS-485 port. The standard protocol shall be Siemens Building Technologies FLN.
2. Automatic control of the drive shall be by means of a 0-10v signal.
3. Siemens shall supply a PI control output of 0-10 volts DC and a hard wired start stop point (digital output) for VFDs.
4. All devices requiring building automation software control shall have direct conventional wired inputs.
5. The PI protocol shall be provided with VFDs for monitoring purposes only. The VFD provided PI shall be configured for Siemens protocol.

D. **Features**

1. All parameters shall be accessible from the keypad.
2. Keypad shall have an assist function to clarify parameter functions,

fault messages, and assist in troubleshooting.

## 6. Ductwork

A. Ductwork shall be designed according to the latest edition of ASHRAE Fundamentals Handbook.

B. Provide ductwork access doors where dirt is likely to accumulate (changes in velocity or air direction) as well as upstream and downstream of inline equipment requiring access (duct heaters, fire dampers, etc.).

C. In facilities designed with non-ducted return air, provide detail of a return air grille showing sound attenuation duct. This needs to be provided in "potentially" noisy areas where sound from equipment might cause a problem in quiet office spaces.

D. Supply ductwork shall be insulated externally per latest ASHRAE 90.1 recommendations.

## 7. Hydronic Piping

A. Piping shall be designed according to the latest edition of ASHRAE Fundamentals Handbook.

B. **Material and Installation**

1. Piping material and connection type shall conform to latest UT System Office of Facilities Planning and Construction (OFPC) specifications and this Standard.
2. Steam and condensate return piping shall be of seamless steel construction. Electric resistance welding is acceptable for chilled water and heating hot water systems.
3. Copper tubing shall conform to ASTM B 280, Type NCR, clean dry and capped.
    a. Annealed-temper copper tube shall not be used for piping larger than 0.625.
    b. Soft copper tubing is not allowed to be used for refrigerant piping at UTSA.
4. All copper pipe must be reamed either by hand or machine after it is cut.
5. Soldered joints are required at UTSA, unless practicality prevents this. In those cases, UTSA will review the project conditions and determine whether crimping tools will be allowed (i.e. Pro Press or other).
    a. When crimping is approved, this method will be accepted for pipe up to 2". Use of crimping on 2" to 4" pipe will have to be reviewed by UTSA on a case-by-case basis. Crimping will never be allowed on pipe larger than 4".
6. Where dissimilar metals must be joined, use dielectric unions or dielectric flanges.

C. **Pipe Sizing**

1. Limit water flow to maximum 10 feet per second or 4 feet of head per 100 feet of pipe. Higher velocities on large bore pipe may be considered on variable flow applications with UTSA Facilities approval.

2. Pipe sizing for distribution system, TEPS, or branch run to building to be confirmed with UTSA Facilities in case expansion capacity is warranted for future connections.

D. Wherever existing piping insulation is disturbed or removed, or new insulation is added, provide "asbestos free" self-adhesive signs on the outside of the final jacketing.
1. Signs shall have minimum 3/4" high white lettering on blue background, equal to W. H. Brady Co., catalog #90293.

E. Piping shall be thermally insulated in accordance with the minimum pipe insulation thicknesses in the most recent version of ASHRAE 90.1. Additional insulation shall be specified, as required, considering anticipated ambient operating conditions to prevent sweating and provide adequate protection from high surface temperatures.
1. Exterior piping requiring insulation shall be covered with aluminum jacket or painted.

F. **Chilled-Water and Hot-Water Interfaces**
1. Refer to Section 11, below, for typical building hookup schematic.

G. **Steam Interface**
1. Refer to Section 12, below, for typical building hookup schematic.

H. **Pressure & Temperature**
1. Hydronic piping shall be designed to operate within the design conditions listed in these design guidelines.

I. **Testing Procedures**
1. Hydronic piping shall be tested in accordance with the most current version of ASME B31.9. This requires pressurizing pipes to 1.5 times the operating pressure for a minimum of 4 hours.

J. **Distribution Piping**
1. See UTSA Design Guidelines Division 33.

## 8. Refrigeration Piping

A. Piping insulation on refrigeration piping to be installed with mitered joints on bends, not pulled over which leads to tearing, in thicknesses as follows: 3/4-inch wall insulation on medium temperature chambers and 1-inch wall insulation on low temperature chambers.

B. Refrigerant shall be R404A for Refrigeration and process dehumidification applications.

C. Select pipe, fittings and components that have design pressure ratings per ASHRAE 15 but not less than the following system design pressures:

| | **Low side (psig)** | **High side (psig)** |
|---|---|---|
| *R404A* | *100* | *400* |

D. All piping shall be rigidly supported from the building structure by means of adjustable ring-type hangers. Welding to building structure will not be permitted.

E. Suction lines shall be sloped towards the compressor, and an inverted trap is required at the top of all suction risers, where condensing units are above evaporators.

## 9. Valves

A. **Material and Valve Class**

1. All control valves and equipment requiring maintenance shall be installed with upstream and downstream isolation valves.
2. Hydronic systems shall utilize lug-style butterfly or 2-piece ball valves for isolation service.
3. All ball valves must have a stainless steel ball and stem and a TFE seat.
4. Butterfly valves of diameter 6" and greater shall have a gear operator.

B. **Pressure Independent Control Valves**

1. Pressure independent control valves shall be used at chilled water and heating hot water HVAC air handling units requiring 2" or greater connections.
2. Material and Installation
   a. All pressure independent control valves shall be designed with a flow control accuracy of no more than ±5%.
   b. All pressure independent control valves shall be of ductile iron body and steel valve plug construction.
   c. All pressure independent control valves shall be designed to operate within the design conditions listed in these guidelines.

## 10. HVAC Load Calculations for Energy Models

A. **Classroom Buildings**

| | Occupancy | | Lighting | | Misc. Loads | |
|---|---|---|---|---|---|---|
| **Hour** | **Weekday** | **Weekend** | **Weekday** | **Weekend** | **Weekday** | **Weekend** |
| **0000** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0100** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0200** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0300** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0400** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0500** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0600** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0700** | 50% | 0% | 10% | 5% | 50% | 5% |
| **0800** | 50% | 0% | 50% | 5% | 50% | 5% |
| **0900** | 100% | 0% | 100% | 5% | 100% | 5% |
| **1000** | 100% | 0% | 100% | 5% | 100% | 5% |
| **1100** | 100% | 0% | 100% | 5% | 100% | 5% |
| **1200** | 100% | 0% | 100% | 5% | 100% | 5% |
| **1300** | 30% | 0% | 30% | 5% | 30% | 5% |
| **1400** | 100% | 0% | 100% | 5% | 100% | 5% |
| **1500** | 100% | 0% | 100% | 5% | 100% | 5% |
| **1600** | 100% | 0% | 100% | 5% | 100% | 5% |
| **1700** | 100% | 0% | 50% | 5% | 100% | 5% |
| **1800** | 50% | 0% | 10% | 5% | 50% | 5% |
| **1900** | 5% | 0% | 5% | 5% | 5% | 5% |

| | | | | | | |
|---|---|---|---|---|---|---|
| **2000** | 5% | 0% | 5% | 5% | 5% | 5% |
| **2100** | 0% | 0% | 5% | 5% | 5% | 5% |
| **2200** | 0% | 0% | 5% | 5% | 5% | 5% |
| **2300** | 0% | 0% | 5% | 5% | 5% | 5% |

| | |
|---|---|
| Miscellaneous Loads | 0.5 Watts per square foot |
| Occupant Density (Small Class) | 15 square feet per person |
| Occupant Density (Lecture Hall) | 6 square feet per person |
| Space Sensible Heat Gain from Occupants | 75 Watts per person |
| Space Latent Heat Gain from Occupants | 60 Watts per person |

## B. Dormitories

| | Occupancy | | Lighting | | Misc. Loads | |
|---|---|---|---|---|---|---|
| **Hour** | **Weekday** | **Weekend** | **Weekday** | **Weekend** | **Weekday** | **Weekend** |
| **0000** | 90% | 90% | 30% | 30% | 30% | 30% |
| **0100** | 90% | 90% | 5% | 5% | 20% | 20% |
| **0200** | 90% | 90% | 5% | 5% | 20% | 20% |
| **0300** | 90% | 90% | 5% | 5% | 20% | 20% |
| **0400** | 90% | 90% | 5% | 5% | 20% | 20% |
| **0500** | 90% | 90% | 5% | 5% | 20% | 20% |
| **0600** | 90% | 90% | 5% | 5% | 20% | 20% |
| **0700** | 90% | 90% | 20% | 20% | 20% | 20% |
| **0800** | 50% | 90% | 20% | 20% | 80% | 80% |
| **0900** | 50% | 50% | 50% | 50% | 80% | 80% |
| **1000** | 30% | 50% | 5% | 5% | 40% | 40% |
| **1100** | 30% | 50% | 5% | 5% | 40% | 40% |
| **1200** | 30% | 50% | 5% | 5% | 40% | 40% |
| **1300** | 30% | 50% | 5% | 5% | 40% | 40% |
| **1400** | 30% | 50% | 5% | 5% | 40% | 40% |
| **1500** | 30% | 50% | 5% | 5% | 40% | 40% |
| **1600** | 30% | 50% | 5% | 5% | 40% | 40% |
| **1700** | 30% | 50% | 5% | 5% | 30% | 30% |
| **1800** | 50% | 50% | 5% | 5% | 30% | 30% |
| **1900** | 90% | 90% | 5% | 5% | 90% | 90% |
| **2000** | 90% | 90% | 90% | 90% | 90% | 90% |
| **2100** | 90% | 90% | 90% | 90% | 60% | 60% |
| **2200** | 90% | 90% | 90% | 90% | 50% | 50% |
| **2300** | 90% | 90% | 70% | 70% | 50% | 50% |

| | |
|---|---|
| Miscellaneous Loads | 2.5 Watts per square foot |
| Occupant Density | 100 square feet per person |
| Space Sensible Heat Gain from Occupants | 75 Watts per person |
| Space Latent Heat Gain from Occupants | 60 Watts per person |

## C. Laboratories

| | Occupancy | | Lighting | | Misc. Loads | |
|---|---|---|---|---|---|---|
| **Hour** | **Weekday** | **Weekend** | **Weekday** | **Weekend** | **Weekday** | **Weekend** |
| **0000** | 0% | 0% | 5% | 5% | 100% | 100% |
| **0100** | 0% | 0% | 5% | 5% | 100% | 100% |
| **0200** | 0% | 0% | 5% | 5% | 100% | 100% |
| **0300** | 0% | 0% | 5% | 5% | 100% | 100% |
| **0400** | 0% | 0% | 5% | 5% | 100% | 100% |
| **0500** | 0% | 0% | 5% | 5% | 100% | 100% |

| | | | | | | |
|---|---|---|---|---|---|---|
| **0600** | 0% | 0% | 5% | 5% | 100% | 100% |
| **0700** | 0% | 0% | 10% | 5% | 100% | 100% |
| **0800** | 30% | 5% | 50% | 5% | 100% | 100% |
| **0900** | 50% | 5% | 50% | 5% | 100% | 100% |
| **1000** | 100% | 5% | 100% | 5% | 100% | 100% |
| **1100** | 100% | 5% | 100% | 5% | 100% | 100% |
| **1200** | 100% | 5% | 100% | 5% | 100% | 100% |
| **1300** | 100% | 5% | 100% | 5% | 100% | 100% |
| **1400** | 100% | 5% | 100% | 5% | 100% | 100% |
| **1500** | 100% | 5% | 100% | 5% | 100% | 100% |
| **1600** | 100% | 5% | 100% | 5% | 100% | 100% |
| **1700** | 100% | 5% | 100% | 5% | 100% | 100% |
| **1800** | 50% | 5% | 50% | 5% | 100% | 100% |
| **1900** | 50% | 5% | 50% | 5% | 100% | 100% |
| **2000** | 50% | 5% | 50% | 5% | 100% | 100% |
| **2100** | 30% | 5% | 50% | 5% | 100% | 100% |
| **2200** | 0% | 0% | 10% | 5% | 100% | 100% |
| **2300** | 0% | 0% | 5% | 5% | 100% | 100% |

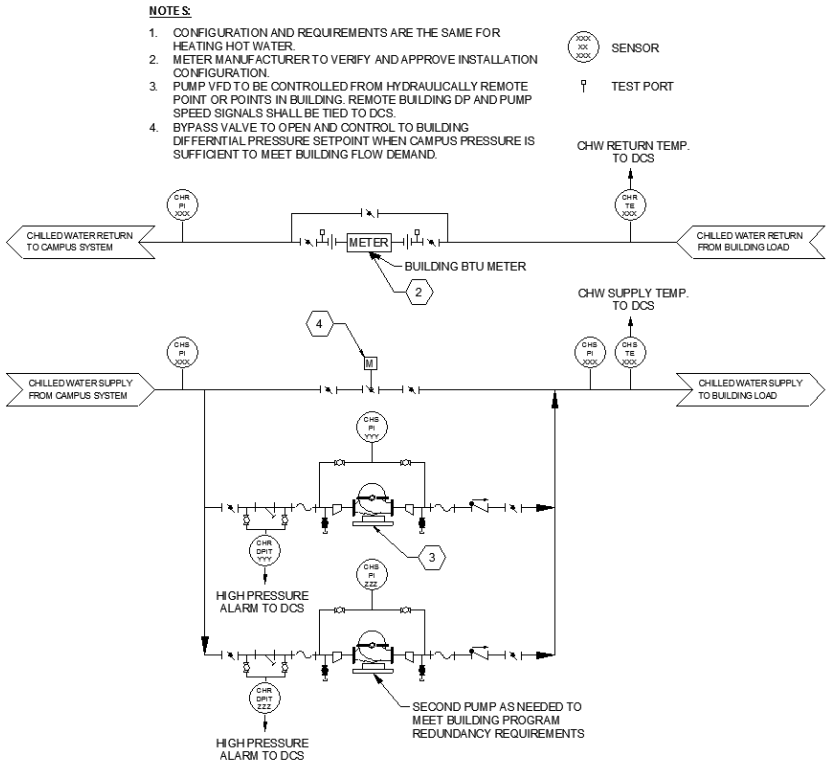
| | |
|---|---|
| Miscellaneous Loads | 5.0 Watts per square foot |
| Occupant Density | 40 square feet per person |
| Space Sensible Heat Gain from Occupants | 75 Watts per person |
| Space Latent Heat Gain from Occupants | 60 Watts per person |

## D. Admin/Office Buildings

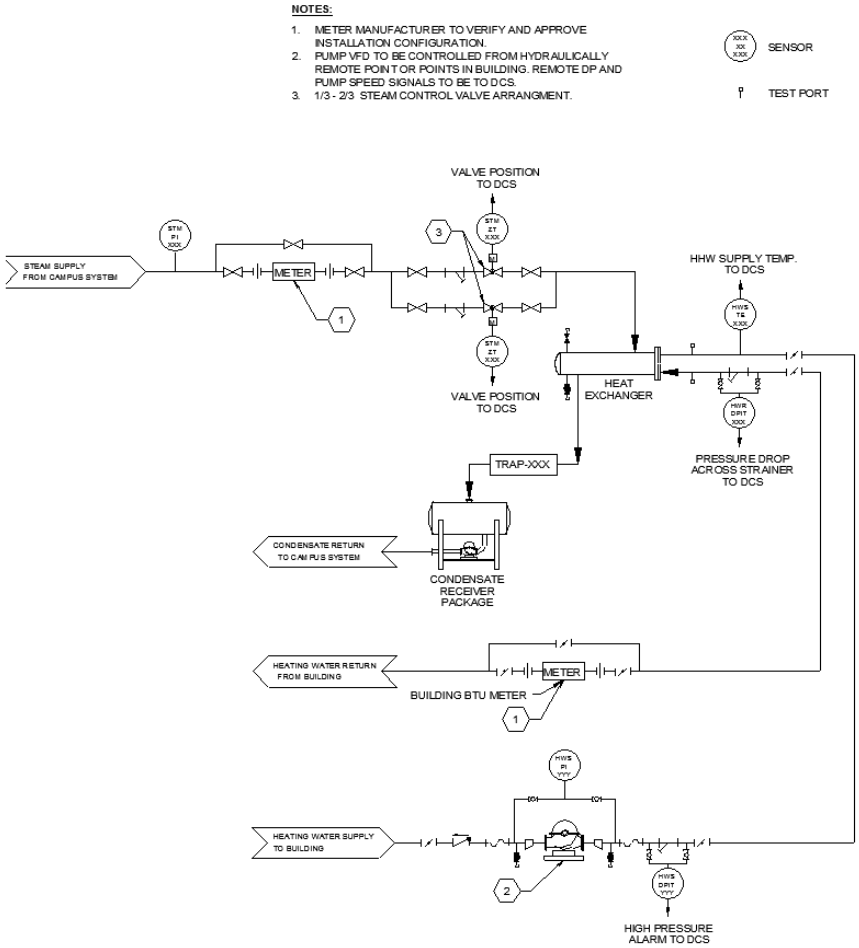
| | Occupancy | | Lighting | | Misc. Loads | |
|---|---|---|---|---|---|---|
| **Hour** | **Weekday** | **Weekend** | **Weekday** | **Weekend** | **Weekday** | **Weekend** |
| **0000** | 0% | 0% | 5% | 5% | 20% | 5% |
| **0100** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0200** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0300** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0400** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0500** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0600** | 0% | 0% | 5% | 5% | 5% | 5% |
| **0700** | 0% | 0% | 10% | 5% | 5% | 5% |
| **0800** | 30% | 5% | 50% | 5% | 80% | 5% |
| **0900** | 100% | 5% | 100% | 5% | 90% | 5% |
| **1000** | 100% | 5% | 100% | 5% | 90% | 5% |
| **1100** | 100% | 5% | 100% | 5% | 95% | 5% |
| **1200** | 100% | 5% | 100% | 5% | 95% | 5% |
| **1300** | 100% | 5% | 100% | 5% | 80% | 5% |
| **1400** | 100% | 5% | 100% | 5% | 80% | 5% |
| **1500** | 100% | 5% | 100% | 5% | 90% | 5% |
| **1600** | 100% | 5% | 100% | 5% | 90% | 5% |
| **1700** | 100% | 5% | 100% | 5% | 95% | 5% |
| **1800** | 30% | 5% | 50% | 5% | 80% | 5% |
| **1900** | 10% | 5% | 10% | 5% | 70% | 5% |
| **2000** | 0% | 0% | 5% | 5% | 60% | 5% |
| **2100** | 0% | 0% | 5% | 5% | 60% | 5% |
| **2200** | 0% | 0% | 5% | 5% | 40% | 5% |
| **2300** | 0% | 0% | 5% | 5% | 20% | 5% |

| | |
|---|---|
| Miscellaneous Loads | 1.5 Watts per square foot |
| Occupant Density | 110 square feet per person |
| Space Sensible Heat Gain from Occupants | 75 Watts per person |
| Space Latent Heat Gain from Occupants | 45 Watts per person |

## 11. Building Chilled & Heating Hot Water Hook-Up Schematic


NOTES:
1. CONFIGURATION AND REQUIREMENTS ARE THE SAME FOR HEATING HOT WATER.
2. METER MANUFACTURER TO VERIFY AND APPROVE INSTALLATION CONFIGURATION.
3. PUMP VFD TO BE CONTROLLED FROM HYDRAULICALLY REMOTE POINT OR POINTS IN BUILDING. REMOTE BUILDING DP AND PUMP SPEED SIGNALS SHALL BE TIED TO DCS.
4. BYPASS VALVE TO OPEN AND CONTROL TO BUILDING DIFFERNTIAL PRESSURE SETPOINT WHEN CAMPUS PRESSURE IS SUFFICIENT TO MEET BUILDING FLOW DEMAND.
SENSOR
TEST PORT
CHW RETURN TEMP. TO DCS
CHILLED WATER RETURN TO CAMPUS SYSTEM
METER
BUILDING BTU METER
CHILLED WATER RETURN FROM BUILDING LOAD
CHW SUPPLY TEMP. TO DCS
CHILLED WATER SUPPLY FROM CAMPUS SYSTEM
CHILLED WATER SUPPLY TO BUILDING LOAD
HIGH PRESSURE ALARM TO DCS
SECOND PUMP AS NEEDED TO MEET BUILDING PROGRAM REDUNDANCY REQUIREMENTS
HIGH PRESSURE ALARM TO DCS

## 12. Heat Exchanger & Building Steam Hook-Up Schematic


NOTES:
1. METER MANUFACTURER TO VERIFY AND APPROVE INSTALLATION CONFIGURATION.
2. PUMP VFD TO BE CONTROLLED FROM HYDRAULICALLY REMOTE POINT OR POINTS IN BUILDING. REMOTE DP AND PUMP SPEED SIGNALS TO BE TO DCS.
3. 1/3 - 2/3 STEAM CONTROL VALVE ARRANGMENT.
SENSOR
TEST PORT
VALVE POSITION TO DCS
STEAM SUPPLY FROM CAMPUS SYSTEM
METER
HHW SUPPLY TEMP. TO DCS
HEAT EXCHANGER
VALVE POSITION TO DCS
PRESSURE DROP ACROSS STRAINER TO DCS
TRAP-XXX
CONDENSATE RETURN TO CAMPUS SYSTEM
CONDENSATE RECEIVER PACKAGE
HEATING WATER RETURN FROM BUILDING
METER
BUILDING BTU METER
HEATING WATER SUPPLY TO BUILDING
HIGH PRESSURE ALARM TO DCS

## 13. Life Cycle Cost Analysis Guideline

A. **Purpose**

1. The University of Texas San Antonio has a long tradition of designing and constructing high quality buildings. Continuing this tradition, Facilities Engineering seeks to ensure that all buildings meet student, faculty and staff needs as efficiently and cost effectively as possible. Cost effectiveness of a design is therefore a key component and Life Cycle Cost Analysis (LCCA) is a design process for evaluating and controlling the initial and future cost of building ownership. Life Cycle Cost Analysis (LCCA) is defined by the National Institute of Standards and Technology (NIST) Handbook 135 as the total discounted dollar cost of owning, operating, maintaining, and disposing of a building or building system over a period of time. NIST Handbook 135 is available at http://www.fire.nist.gov/bfrlpubs/build96/PDF/b96121.pdf.
2. LCCA is based on the premise that multiple building design options can meet programmatic needs and achieve acceptable performance, and that these options have differing initial costs, operating costs, maintenance costs, as well as different life cycle costs. By comparing the life cycle costs, LCCA can show the trade-offs between low initial first cost and long-term cost savings. Thus, the most cost-effective system for a given use can be identified, and the length of time it will take to "pay back" the incremental cost for this system can also be determined. In keeping with UTSA's sustainability practices, LCCA can identify environmentally desirable solutions. Careful design choices that result in efficient use of energy, water and other resources often yield long-term cost savings. In addition, should environmentally friendly choices not save money over time, LCCA may reveal that their additional cost over time is minimal. These guidelines define the LCCA process, and establish the standards and metrics to ensure accurate and consistent life cycle data collection and evaluation across projects.

B. **General Requirements**

1. During the Schematic Design (SD) and Design Development (DD) phases of a project, the A/E is required to perform at least three (3) LCCA comparative analyses from several building system categories. Each LCCA comparative analysis can have up to four (4), or more, alternatives (one base case plus three alternate cases). Building system categories are as follows, but are not limited to:
    a. **Energy Systems**
        i. Central plant vs. stand alone system chillers and boilers
        ii. Equipment options for stand-alone systems (air cooled chillers vs. refrigerant-based direct expansion [DX] units)
        iii. Additional pipe or duct insulation vs. ASHRAE 90.1 minimum standards.
        iv. Alternative energy systems
        v. Use of heat recovery systems and other energy saving systems and equipment.
    b. **Mechanical Systems**

i. Air distribution systems (variable volume vs. constant volume, overhead vs. underfloor)
ii. Water distribution systems (various piping systems and pumping options)
iii. Consider separate systems for areas with different utilization schedules
iv. Optimize piping and duct sizes with respect to friction losses
v. Optimize equipment operation schedules
vi. Optimize building ventilation systems

c. **Electrical Systems**
i. Indoor lighting sources and controls
ii. Use of natural lighting and day lighting controls
iii. Outdoor lighting sources and controls
iv. Power distribution (transformers, buss ducts, cable trays)

d. **Building Envelope Systems**
i. Building skin options (masonry, precast, metal panels)
ii. Additional building insulation
iii. Roofing systems (types, materials, insulation methods)
iv. Glazing, daylight, and shading options

e. **Building Interior Construction**
i. Floor covering (carpet, terrazzo, tile, vinyl tile)
ii. Interior partitions (movable vs. fixed)

f. **Building Siting/Massing**
i. Orientation, floor to floor height, and overall building height
ii. Landscape, irrigation, and hardscape options

g. **Structural Systems**
i. Systems/materials selection (wood vs. steel vs. concrete, cast-in-place vs. pre-cast)
ii. Foundation system (slab on grade, structural, crawl space, drilled piers, auger cast, pilings, spread footings)

C. **Selecting Cost Effective Alternatives**

1. System designs shall be evaluated by the design team on the basis of total ownership and operations cost over a period of twenty (20) years for, not energy or capital cost alone. Alternate terms may be used with UTSA Facilities approval. Submission of owning and operation cost analysis shall be required at the completion of Schematic Design Phase.
2. Alternatives that result in a simple payback of 5 years or less are required to be incorporated into the project. Alternatives that result in a payback of 6 to 10 years are strongly encouraged to be incorporated into the project. Alternatives with a payback greater than 10 years are optional.

D. **LCCA Software**

1. Project A/E shall use either of the following software programs for LCCA analysis. BLCC is the preferred software. User Friendly Life-Cycle Costing is allowed only for small, less complex buildings, with prior approval from the UTSA project manager.

2. BLCC – Available from NIST at *www1.eere.energy.gov/femp/information/download_blcc.html*
3. User Friendly Life-Cycle Costing – A spreadsheet implementation of BLCC and available at *www.doe2.com*

E. **The LCCA Process**

1. The LCCA process involves the Project A/E and UTSA, Physical Plant and Users (Project Team) and requires that they establish clear objectives, determine the criteria for evaluating alternatives, identify and develop design alternatives, gather cost information, and develop a life cycle cost for each alternative.
2. The Project Team should work with UTSA staff to establish clear objectives in evaluating alternatives. LCCA can capture dollar cost variations between alternatives and show which option has the overall lowest cost.
3. The two metrics to be used and calculated in the LCCA are the Life Cycle Cost of each alternative and its Payback over an agreed upon study life. Consideration is given to total costs and the time it takes to recover an incremental initial investment incorporating the time value of money. As mentioned above, Life Cycle Cost is defined as the total discounted dollar cost of owning, operating, maintaining, and disposing of a building or building system over a period of time.
4. The Project Team should develop at least three alternative designs.
    a. The first alternative design is the "base case" and is the standard design or minimum requirement for a project. The base case is typically identified as having the lowest initial cost of all the alternatives.
    b. The remaining alternative designs are developed to evaluate against the "base case." The Project Team should use their experiences and judgment in selecting relevant building and system component alternative designs.
    c. For each alternative design, the Project A/E should gather cost information. Cost information should include, but not be limited to, the following:
        i. Initial Costs
            - Construction costs (labor, materials, equipment, etc.)
            - Soft costs (design fees, permit fees, etc.).
        ii. Annual Future Costs
            - Operating Costs (utility costs such as electricity, gas, water, steam, chilled water, etc. and service costs such as custodial, etc.)
            - Maintenance Costs (preventative and reactive)
        iii. Non-Annual Future Costs
            - Replacement Costs (planned maintenance, renovation at a future date, etc.)
            - Demolition Costs (if required)
        iv. Note: Residual Value default is set at zero ($0) for all studies and not included in LCCA unless otherwise directed.
    d. For each alternative, including the base case, the Project A/E

should calculate the LCC and Payback metrics. Each alternative should be evaluated using these two metrics, and recommendations should be made as to which alternative design should be incorporated into the project.

e. All LCCA efforts should be completed in the Schematic Design phase of the project and updated if significant design changes occur after SD.

F. **BLCC-Specific Inputs**

1. The project A/E shall use the following parameters to build the LCC model when using the BLCC Program. All inputs are subject to change based on input from UTSA Facilities personnel. Refer to Division 23, Section 10, for energy modeling parameters.
2. Upon opening the BLCC program, create a new Federal Analysis, Financed Project, or a new FEMP Analysis, Energy Project. The project A/E is responsible for selecting the most relevant analysis method.
3. Project Level Entries
   a. General Information Tab:
      i. Location: Texas
      ii. Utilize End-of-Year Discounting Convention
      iii. Utilize Current Dollar Analysis
      iv. Set Nominal Discount Rate to 6.0%
   b. Key Dates Tab
      i. Set Base Date
      ii. Default Length of Study Period shall be 20 years.
   c. Add Alternatives Tab
      i. Create Baseline and add other alternatives in the comment box.
4. Alternative Level Entries
   a. General Information Tab
      i. Enter Alternative description
   b. Contract Costs – Annually Recurring Contract-Related Cost
      i. Cost Type: Debt Service
      ii. Create Cost
      iii. Calculate the annual simple mortgage payment for the estimated construction cost based on a 20 year term and 4.0% interest, and enter this in the amount box.
      iv. If payments are to be locked for the length of the term, change escalation rate to 0%.

5. **Energy Costs Subfolder:**
   a. Electricity
      i. Utility: pull down Electricity and Create Cost
      ii. Annual Consumption: Enter value from energy model.
      iii. Click Energy Cost tab
         - Change Rate Schedule to Industrial
         - Enter price/kWh: $0.059 or most current rate available from UTSA
         - Retain DOE Price Escalation Rates
   b. Chilled Water (Go back to Energy Costs Subfolder)

i. Click Energy Cost tab:
ii. Utility: pull down Electricity and Create Cost
iii. Name: Chilled Water
iv. Annual Consumption: Enter value from energy model.
v. Click Energy Cost tab
- Change Rate Schedule to Industrial
- Enter price/MBtu: $0.01268 or most current rate available from UTSA
- Retain DOE Price Escalation Rates

c. Steam (Go back to Energy Costs Subfolder)
i. Click Energy Cost tab:
ii. Utility: pull down Natural Gas and Create Cost
iii. Name: Steam
iv. Annual Consumption: Enter value from energy model.
v. Click Energy Cost tab
- Change Rate Schedule to Industrial
- Enter price/MBtu: $0.01694 or most current rate from UTSA
- Retain DOE Price Escalation Rates

d. Natural Gas (Go back to Energy Costs Subfolder)
i. Click Energy Cost tab:
ii. Utility: pull down Natural Gas and Create Cost
iii. Annual Consumption: Enter value from energy model.
iv. Click Energy Cost tab
- Change Rate Schedule to Industrial
- Enter price/therm: $0.65 or most current rate from UEM
- Retain DOE Price Escalation Rates

e. Heating Hot Water (Go back to Energy Costs Subfolder)
i. Click Energy Cost tab:
ii. Utility: Pull Down Natural Gas and Create Cost
iii. Name: Heating Hot Water
iv. Annual Consumption: Enter values from energy model.
v. Click Energy Cost tab
- Change Rate Schedule to Industrial
- Enter price/MBtu: $0.01563 or most current rate from UEM
- Retain DOW Price Escalation Rates

f. Domestic Hot Water (Go back to Energy Costs Subfolder)
i. Click Energy Cost tab:
ii. Utility: Pull Down Natural Gas and Create Cost
iii. Name: Domestic Hot Water
iv. Annual Consumption: Enter values from energy model.
v. Click Energy Cost tab
- Change Rate Schedule to Industrial
- Enter price/MBtu: $0.01255 or most current rate from UEM
- Retain DOW Price Escalation Rates

6. **Water Costs Subfolder**
a. Cost Name: Domestic Cold Water and Create Cost
b. Units: 1,000 Gallons

c. Annual Water Usage: Enter Calculated Values
d. Price/Unit: $1.56 for usage, $4.39 for disposal.
e. Price Escalation Rates tab
i. Usage and Disposal Cost Escalation: 3.00%

7. **Capital Costs Subfolder**
a. OM&R Costs – Annually Recurring Subfolder
i. Cost Name: User Defined and click Create Cost
- Amount: Enter calculated value
- Annual Rate of Increase: 2.5%
b. OM&R Costs – Non-Annually Recurring Subfolder
i. Cost Name: User Defined and click Create Cost
- Years/Months: enter value from base date
- Amount: Enter calculated value
- Annual Rate of Increase: 2.5%

G. **User-Friendly Building Life-Cycle Cost Analysis-Specific Inputs**

1. The project A/E shall use the following parameters to build the LCC model when using the User-Friendly Building Life-Cycle Cost Analysis. All inputs are subject to change based on input from UTSA Facilities personnel.
2. General Data Tab:
a. Set Base Date
b. Enter Real Discount Rate: 3.5%.
c. Length of Study Period shall be 20 years depending on systems evaluated.
d. DOE Fuel Price Escalation Region: South (Region 3)
e. Analysis Sector: Commercial (2)
f. Second Fuel Type: Natural Gas
g. Uniform Electric Price Escalation Rate: Retain DOE Rates
h. Uniform Natural Gas Price Escalation Rate: Retain DOE rates
3. LCC Tabs
a. Enter all annual and non-annual reoccurring costs, electric and natural gas costs.
b. LCC0 is the baseline option, and the additional tabs (LCC1, LLC2, etc…) are to be used as needed.

*Division 25*

# Integrated Automation

## 1. HVAC Control System (Building Automation System)

A. **Approved System**

1. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
2. Approved manufacturer: Siemens
3. Approved product: Apogee Building Automation System
4. For any centrally monitored HVAC controls system.

B. **Device Control**

1. All devices requiring building automation software control shall have direct conventional wired inputs.
2. Siemens shall supply a PI control output of 0-10 volts DC and a hard wired start stop point (digital output) for variable frequency drives (VFD's).
   a. The P1 protocol shall be provided with variable frequency drive (VFD) for monitoring purposes only. The VFD provided P1 shall be configured for Siemens protocol.

C. **Thermostats**

1. Locate thermostats adjacent to light switches, where feasible.
2. Do not locate thermostats on open walls or columns.
3. Where light switch does not occur, thermostat should be located adjacent to primary entry door into room, or adjacent to sidelight of door.
4. Indicate which thermostat is tied to which VAV box on all plans. This can be done with a line connecting the 2 devices or can be done with an addition of a note on the thermostat key.

D. **Controls Graphics/Points**

1. Final graphics at the UTSA Operations monitoring station shall indicate accurate information to include the final building name acronym for individual points and room numbers.

E. **Unitary Equipment**

1. Unitary equipment providing a utility service shall be monitored and alarmed through the BAS (i.e. air compressor, vacuum pumps, domestic water boosters, etc.). In addition to alarm points available within the manufactured equipment, the utility service shall be monitored and alarmed (i.e. a pressure sensor installed in the main line downstream of the equipment).

*Division 26*

# Electrical

## 1. Basic Electrical Requirements

### A. Grounding Conductor Integrity

1. The main grounding electrode conductor coming in the building cannot be spliced before it connects to the Main Service Equipment ground bar.
2. The Main Bonding Jumper will be installed at the Main Service Disconnect Enclosure. The Main Bonding Jumper shall be un-spliced.
3. Approved compression fittings and setscrew lugs shall be used for grounding purposes. Multiple conductors installed in a single barrel lug will not be permitted.
4. Cad Welding of conductors will be required for exterior underground direct buried connections and splices.
5. Use appropriate copper to aluminum connectors when grounding aluminum cable trays. This will prevent electrolysis at the connection point.

### B. Underground Conduit and Boxes

1. Underground pull and junction boxes shall be the Quazite type or equal.
2. No PVC boxes shall be used for underground installations or installed in curbs, sidewalks, etc.
3. All underground circuits must be run in minimum Schedule 40 PVC.
4. Minimum burial depth of underground conduit shall be 18" from the top of highest raceway to finished grade. Conduits run under streets, parking lots, driveways, etc., shall be in accordance with the NEC.
5. All underground conduits must be encased in concrete with a minimum cover of 2" above the highest conduit. Confirm reinforcing with UTSA.
    a. Exception: Conduits containing branch circuits rated 600-volts or less and buried at a minimum depth of 36" (from top of highest conduit to finished grade) shall not require concrete encasement.

### C. Electrical Equipment Rooms

1. Electrical equipment rooms shall be designed to provide reasonable clearances so that construction tolerances can be maintained.
2. Electrical designer shall select the equipment from approved manufacturers, using the largest piece of equipment available from all available.
3. In addition to the code mandated horizontal clearance requirements, provide a minimum of 6 inches of clear space on both sides of the electrical panelboards. Spaces between 2 panelboards mounted on the

same wall can be combined.

4. The minimum vertical clearance space required by code shall be extended to structure above the equipment. No ductwork, piping, conduit or other equipment shall be located in this clear space.
5. Electrical designer shall demonstrate compliance graphically, providing a minimum ¼ inch scale drawings of rooms, and clearly indicating the clearances required.
6. Electrical subcontractor shall provide shop drawings that demonstrate compliance with design drawings.
7. Wiring Gutters, Conduit Runs, and Boxes
    a. Boxes mounted above ceilings must be easily accessible without the need to negotiate between piping, ducts, equipment, cable trays, building structure, etc.
    b. Conduits penetrating walls shall be run straight through with no part of a bend "turning in or out" of the wall. Conduit may terminate into approved boxes, condulets or gutters.
    c. No "square cross-section" gutters or wireways shall be used: rectangular cross-section shall be used with the long dimension at least 150% of the short dimension and size no less than 4" x 8". The cover shall be installed on the longer dimension side. The shorter dimension of the cover shall not be less than twice the depth of the wireway or gutter.
        i. The cover side of junction boxes may be square.
    d. Sheetmetal junction boxes 6" x 6" (cover side) and smaller shall not be used. The intent of this section is not to prohibit the use of standard 4" square, 4-11/16" square and standard octagon boxes.
        i. The use of extension boxes for standard 4" square, 4 11/16" square, handy box and octagon boxes are prohibited.
    e. The dimensions of any type of gutter, wireway, box or condulet must comply with the requirements of NEC 314.28 (A) (1) & (2). This also includes boxes, gutters or wireways mounted above panels and distribution boards.
    f. Caddy type B18 series supports (or similar) shall not be used for conduit supports at boxes. Individual support rods (minimum ¼") and hardware shall be used to comply with NEC support requirements.
8. All floor-mounted electrical equipment must be installed on top of a 3,000 psi, 3-1/2" high housekeeping pad, finished out (no honeycombing permitted) and with chamfered corners.
9. Panelboards, motor starters, and switchgear installed in existing buildings must be of same manufacturer as existing equipment where practicable. UTSA shall approve manufacturer when equipment manufacturer no longer exists.

D. **UTSA Electrical Primary System**

1. UTSA electrical primary system is a loop design. The majority of our existing buildings have (and all new buildings shall be designed to include) a double-ended main-tie-main substation with two separate loop feeders providing power to the building. This provides four

incoming cables to feed the building in case of multiple cable failures. Each transformer on each end of the main-tie-main substation needs to be sized to handle the entire building load and anticipated future load growth. This allows redundancy in case of a transformer failure. Also, during annual maintenance of the primary switch gear the entire building load can be shifted to one transformer and the other transformer and switchgear can be de-energized for cleaning without affecting the building occupants.

2. All electrical conductors, bussways, dry type transformers, panelboards and other electrical components utilized on new UTSA campus projects shall be copper only. Aluminum components are not acceptable.

E. **Electrical Housekeeping**

1. Upon completion of projects:
   a. all equipment interiors and devices within (including circuit breakers, bussing, conductors, transformer coils, etc.), shall be thoroughly cleaned, vacuumed.
   b. all exterior surfaces of new or existing panels (including the tops), transformers, junction & terminal boxes, etc., shall be vacuumed, and thoroughly cleaned.
2. All un-used openings in electrical equipment, junction & outlet boxes, panelboards, etc., shall be effectively sealed using UTSA approved means.
3. OSHA approved lockout tag-out procedures shall be used to safely isolate circuits.
4. Circuits that have been de-energized during the course of the workday need to either be re-energized by the end of the workday or that appropriate UTSA personnel have been informed.
5. All outlet & junction boxes (including existing) in exposed areas or concealed behind doors, cabinets, or lift-out ceiling tiles shall have covers installed.
6. Anchors and pins used with powder activated guns are not permitted for wire support to structure.
7. Abandoned raceway systems and wiring shall be removed from the circuit breaker or fuses where the circuit(s) originate to outlets.
8. Type MC or AC cable shall not be used for permanent wiring.
9. All above ceiling sensors shall be located with a corresponding small round purple sticker adhered directly to the ceiling surface.
10. #10 wire shall be maintained on all homeruns to the first device.

## 2. Raceways

A. **Rigid Metallic Conduit, IMC and EMT**

1. Rigid metallic conduit or IMC shall be wrapped with corrosion protective tape when installed below grade or in concrete.
2. Set screw connectors and couplings will not be permitted for Electrical Metallic Tubing (EMT). EMT fittings shall be compression-type steel and insulated-throat connectors.
3. No conduit under 3/4 inch trade size will be permitted, except for special applications where approved by UTSA.
4. All electrical fittings shall be approved for use as designed by

manufacturer and NEC.

5. Multiple conduits shall be installed on racks and spaced a minimum ¾". Crossing of pipes is strictly limited. Box and condulet covers shall not be blocked by conduits, boxes, equipment or other obstacles.
6. Conduit runs shall follow the structure on which they are mounted and be installed plumb, square and level. Long offsets on branch circuit conduits shall not be used to clear beams, columns and large equipment or to span distances where 90-degree bends could be used. Condulets and boxes shall be used to turn outside corners of equipment and structural/architectural members.
7. Elbows and bends on conduits running along the surface of a wall, ceiling or floor shall not turn into the structure.
8. Conduits, boxes and equipment shall not be located closer than 6" above a lift-out ceiling.
9. Surface raceways containing wiring devices shall have a minimum of two conduits per divided section per 10' length.
10. Flexible Metal Conduit
    a. Flexible metal conduit (standard and liquidtight) shall only be used where the conditions of operation and maintenance of equipment require flexibility.
        i. Flexible metal conduit used to connect motorized equipment, transformers, etc., shall not exceed 30" length.
        ii. Flexible metal conduit used for branch circuits, fixture whips, and runs under floor tile systems shall not exceed 72" length.
    b. Flexible metal conduit (standard and liquidtight) 45- and 90-degree connectors shall not be used above inaccessible ceilings to wire fixtures and equipment.

B. **Condulets**

1. "L" type condulets (LBs, LRs, LLs) shall only be used where conduit must run around the outside corner surface of equipment or building structure (sharp turns) or where conduit must penetrate walls, ceilings or floors.
2. Condulet use is limited to 1" trade size and smaller.
    a. Condulets shall only be used in electrical and mechanical rooms.
    b. Condulets shall not be used above ceilings.

C. **Wiremold/Plugmold** (see Appendix A for detail)

1. Wiremold shall be steel or aluminum decorative type, not plastic or PVC. Acceptable models are #DS4000 (steel & aluminum) and 2400/4000 series (steel and ivory color).

D. **Data Duplex Receptacles**

1. Each data receptacle can be wired to accommodate up to 6 separate computer or telephone drops.
2. Provide single data drop at the following:
    a. Each group of up to 6 drink vending machines.
    b. Each group of up to 6 food vending machines.

c. Each kiosk.
d. At mechanical rooms, as directed by UTSA.

E. **Receptacle Cover Plates**
1. Provide stainless steel cover plates in the following areas:
   a. Mechanical/Electrical Rooms
   b. Data/Communications Closets
2. Provide plastic cover plates, in UTSA-approved color in all other spaces.
3. Recessed outlet and junction boxes shall not have galvanized square, round, octagon or handy box type cover plates installed: a device ring must be installed with a finished plate matching the building interior standard.

F. **Cable Trays**
1. At hard ceiling areas, stop cable trays either side of ceiling and provide conduit above ceiling to bridge between trays.
2. Aluminum ladder is the only acceptable style.
3. Require that trays be mounted in such a manner that side tilt is controlled.
4. All cable trays shall be grounded to main building electrode system, and according to the TIA/EIA Standard.
5. Cable trays shall be continuous at joints. The use of hinged or pivot brackets or connectors is prohibited.

G. **Standard Power**
1. Provide convenience outlet(s) in mechanical rooms, as directed by UTSA.

H. **Electrical Dedicated Circuits**
1. Provide dedicated circuits for the following:
   a. At "pay-to-use" copiers.
   b. At Data/Comm closets.

I. **Emergency Power**
1. When emergency power is provided to the building, provide emergency power for the following:
   a. For connection of all equipment in Data/Comm closets.
   b. For connection of all equipment in Security closets.
   c. Fire alarm control panels and fire pumps
   d. Emergency systems including exit lights, emergency lighting
   e. Stairwell lighting, electrical vault lighting, electrical closet lighting
   f. Elevator selector controls
   g. Critical loads including laboratory freezers, incubators and other equipment, computers, etc., as directed by UTSA.
2. Standby/Emergency Power shall be in a separate raceway from normal power.
3. Automatic Transfer Switches
   a. Automatic transfer switch shall be ASCO, 4-pole with isolation by-pass.

4. Emergency Beacon Lights
    a. Beacon lights are provided to indicate when the emergency generator is running. They shall serve as notification to appropriate personnel so responsive action can be taken to minimize the risk of generator burn out.
    b. Components used at UTSA are as follows:
        i. Red Rotary Beacon: Edwards #52RNS-40 WH
        ii. Wall Mounting Bracket: Edwards #WBR

J. **Branch Circuit Wiring, Conductors and Devices**

1. All branch circuit wiring shall be stranded. Green #12 solid conductors will be permitted for grounding conductors and connection to wiring devices.
2. The minimum size of branch circuit wiring leaving circuit panels is #10, and shall extend from OCPD to a junction box in the area of the outlets or utilization equipment.
3. Multi-wired (shared neutral) branch circuits shall not be installed. All 120- & 277-volt branch circuits shall have a dedicated neutral conductor.
4. The minimum size of straight-blade wiring devices and toggle switches is 20-amp.
5. All wiring devices shall be back-wired type, with set screw. These devices allow insertion of a straight section of conductor into the back and require tightening the side screws and internal terminal plates to make a positive connection.
    a. Connection of stranded grounding conductors to wiring devices without back-wired terminals shall be made by pigtail joint and a fork-type #12 insulated crimp-on terminal. Only one conductor may be terminated onto the grounding connection of a device.
    b. Devices using push-in wiring connections that rely solely on spring tension to make the connection will not be permitted.
6. Outlets exposed to the weather or in wet locations must be protected by approved metal point-of-use covers.

## 3. Electrical Identification

A. Identification of electrical power cables shall be in accordance with the following:

**1. 1604 Campus – Conductor Color Code:**

| POWER | 120/208V | 277/480V |
|---|---|---|
| Phase A | Black | Brown |
| Phase B | Red | Yellow |
| Phase C | Blue | Purple |
| Neutral | White w/ Tracer to match phase color | Grey w/ Tracer to match phase color |
| Ground | Green | Green |
| Switchleg | Pink, marked with tape in same color as phase conductor where applicable | Pink |

**2. 1604 Campus - Low Voltage:**

| | |
|---|---|
| Fire Alarm | Red |
| Security | Blue & Yellow |
| Clock | Green & White |
| Telephone | White |
| Data | Bright Blue |
| HVAC Controls | Dark Blue |

### 3. 1604 Campus – Medium Voltage:

| | |
|---|---|
| Primary/Operating | **13,800 Volt** |
| Phase A | Brown |
| Phase B | Orange |
| Phase C | Yellow |
| Ground | Green |

### 4. Enclosure Color Coding:

| System | **Color of Box Cover** |
|---|---|
| Fire Alarm | Red, with Black "FA" text |
| Emergency Power | Red, with Black "E" text |

5. **Labeling of Circuits and Devices**
   1. All branch circuits shall have circuit numbers attached at all connection points to over-current, switch and outlet devices and at junction points. Associated neutral conductors shall also be labeled.
   2. Outlet and switch plates shall have clear (transparent) labels with black characters attached which indicate the panel and circuit number(s) associated with the device. Characters shall be approximately 1/8" in height. Junction boxes shall use minimum ¼" characters.
      a. Labeling of cover plates for emergency devices shall be clear with red characters not larger than 1/8" high.

## 4. Grounding

A. All electrical systems to be grounded per NEC 2005 (or latest version).

B. Bond the cold domestic water pipe, inside the building, using an approved grounding strap. The ground strap shall be installed in an accessible location where it can be visually , mechanically, and electrically inspected. Add wire to mbg - tie a phenolic label to this wire, inside the main electrical room, with the following legend: cold domestic water bonding wire - bond location at the mechanical room #.....

C. All bonds to main building electrode system (from any equipment or panel)are to be clearly labeled

D. All bonds to building steel from dry type transformers to be accessible, labeled, and locations clearly shown on plans.

E. All bonds for case grounding to be accessible and labeled.

F. All bonds to counterpoise to be accessible, labeled, and locations clearly shown

on plans.

G. All down conductors for lightning protection system in columns or structure to be accessible, labeled, and locations clearly shown on plans.

H. All ground conductors for telecommunication cable tray, racks and other equipment to be clearly labeled and accessible.

I. All ductbanks should include ground conductor in concrete structure that connects back to main building electrode system.

J. All telecommunication hardware, cable ladder, conduit, equipment racks, protection units, shielded cabling, etc. should be bonded to main building electrode system and meet all TIA/EIA Standard.

K. All other systems requiring power; Community Antenna Television, Radio Distribution systems, and Network-Powered Broadband Communication Systems should be bonded according to NEC 2005 or latest edition (reference Article 820.100 and Article 830.100 and other articles that apply). Coordinate and ensure proper integration with Main building electrode system.

## 5. Panelboards

A. **General**

1. Approved bolt-in type breakers must be used in all panelboards installed. Plug-in breakers shall not be used.
2. Electrical panels installed outside of electrical closets shall have locking covers to prevent tampering.
3. The width and depth of wiring space inside panel and distribution boards shall be adequate for the conductors being installed and for future installations.
    a. Panelboards 400-amp and larger must have substantially greater width than lower rated branch circuit panelboards and shall not be less than 30" wide.
4. Panelboard schedules shall be installed on the backside of the panel door. Schedule shall be computer generated. Schedule shall be inserted into clear plastic sleeve, and sleeve shall be permanently attached to backside of door panel. Schedule shall be removable easily. The schedule shall include the following information:
    a. Panelboard No.: Panelboard number as assigned on drawings
    b. Room No.: Room number panelboard is located in
    c. Served From: Number of transformer or distribution panel that feeds panelboard
    d. Date Published: Date panelboard information was published
    e. Circuit Number: Each circuit number identified
    f. Description: Room number(s) and location within room which the circuit feeds and equipment name (e.g., printer, VAV box, security cameras) if applicable, or device type (e.g., receptacle, I.G. Recpt., floor box and furniture, TVSS), or "spare" if the circuit is not used.
5. Provide electronic copy of all panelboard schedules as part of the closeout documentation.

6. TVSS units shall be installed on 120/208 volt branch panels, 225 amp and smaller, and meet most recent 3rd edition specifications.
7. A free-standing, independently supported NEMA-3 rated electrical disconnecting means shall be installed for each rooftop exhaust fan, AC unit, etc.

B. **At Labs**
1. UTSA does not want electrical panels placed inside of Labs. Our preference is for the panels to be in the public corridor, at the alcove to the entry into the Labs.
2. Mounting the panel outside the lab in the alcoves on either side of the door (hinge or strike side) is acceptable.
3. Each lab should have its own dedicated panel or panels, with enough spare capacity for future expansion. Locating the panels next to the labs they serve eliminates any confusion as to where the lab is fed.
4. The panels should be equipped with a shunt trip main breaker connected to an "emergency power off " shut down device (push button or switch) located inside in the Lab. The location should probably be in the vicinity of the gas cut-off, and mounted high enough and in a location that it would not be blocked in the future. A clear plastic cover that has local alarm to prevent inadvertent activation shall also be provided.

C. **At Data/Comm closets**
1. Circuits for Data/Comm closets should be routed to electrical panels located in the electrical closet for that particular floor.

## 6. Metal Clad Switchgear

A. Draw-out Circuit Breakers – Cutler-Hammer, Square D and GE are approved manufacturers.

B. 480-volt switchboard main and tie breakers shall be electrically operable.

C. All 15 KV rated switching devices shall be electrically operable vacuum breakers.

D. Remote operators shall be provided for each of the feeder breakers in the switchgear. The remote operators shall be wired to a remote switching panel, minimum 14-gauge sheetmetal, location approved by UTSA.
1. The panel cabinet shall be equipped with individual pistol grip open/close switches (same type & manufacturer as those mounted on switchgear) for each breaker in the switchgear, including main circuit breakers, tie circuit breaker each feeder circuit breaker, and 480-volt switchboard mains and ties, and interlocked with a 3-position switch on each breaker cubicle door.
    a. Each control shall indicate open/closed and rack-in/rack-out LED indicating lights to indicate the status of each circuit breaker.
    b. An electrically operable remote racking device must be provided. This device shall be capable of being installed with the switchboard front door in the closed, secured position.

c. Switch position for local control shall be momentary.

2. The control box shall be housed in a lockable enclosure with hinged door(s). Verify panel location with UTSA Electrical Supervisor.

E. Conductor terminations made to the switchgear shall be aligned in a "side-to-side" configuration in lieu of a front to back.

F. Air interrupter switching is preferred by UTSA over SF-6 gas switches.

G. 15 KV breaker compartments shall be full sized. Bussing and terminations shall be from side-to-side, not front-to-back.

1. 15 KV breakers connected by cables shall have grounding studs (for the connection of grounding cables) near cable terminations and directly accessible from compartment opening.

H. UTSA requires factory training for 15KV and 480-volt switchgear and breakers.

## 7. Oil-Filled Transformers

A. Oil-filled transformers shall have factory installed pressure, oil level, and temperature gauges. Oil drain valves and ports must be easily accessible near the access door at the front of the enclosure. Cable shall not interfere with operation or accessibility when future oil samples are taken.

B. Oil-filled transformers shall be equipped with an externally operable, load-break, oil, rotary switch.

C. Nitrogen "blanket" shall be pressurized to a minimum of 2 PSI when energized.

## 8. High-Voltage Equipment (13,800V+)

A. Breakers and switches capable of being racked in and out shall be provided with a portable motorized unit that will allow removal and reconnection of the apparatus by remote control.

1. A minimum of 30' of cord shall connect the motorized unit and the controller.

2. Connection of the motorized unit shall be accomplished with the outer switchgear door closed.

## 9. Cables & Terminations (Medium Voltage)

A. 15kV rated Medium Voltage Cable – Okinite and Pirelli are approved manufacturers. Cable should be shielded, EPR insulation, 133%.

B. 15kV rated Medium Voltage Cable Splice and Termination Kits – 3M or Elastimold are approved manufacturers.

## 10. Lighting Fixtures

A. **General**

1. Do not design around "exotic" or "one-of-a-kind" fixtures that cannot be repaired quickly and cost effectively.

2. Unless special lighting color requirements are a priority, install compact fluorescent bulbs (CFL's) in lieu of incandescent bulbs.
    a. CFLs are acceptable as long as the ballast is accessible. If the ballasts are not accessible, UTSA requires Edison screw type bulbs.
    b. Edison screw type bulbs are also required in high locations, particularly in stairwells.

B. **Lighting Control**

1. Per ASHRAE Standard 90.1, 9.2 Mandatory Provisions, 9.2.1 Lighting Control, 9.2.1.1 Automatic Lighting Shutoff. Interior lighting in buildings larger than 5000 ft2 shall be controlled with an automatic control device.
2. Provide occupancy sensors light control at the following spaces:
    a. Restrooms
    b. Classrooms
    c. Offices
    d. Student offices
    e. Conference rooms
    f. Break rooms
3. Occupancy sensors shall be ceiling mounted.
4. Provide standard light control at the following spaces:
    a. Research areas
    b. Hallways
    c. Labs
    d. Shops
    e. Electrical closets
    f. Mechanical closets
    g. Store rooms
5. Place large lecture hall lighting control on the operations console.
    a. The "Operations Console" is the 24/7 operation UTSA has that monitors HVAC and fire alarm systems. The software (BAS; building automation system, EMS; energy management system, or whatever other control acronym used) at this station is currently Siemens MS 2000, but the new buildings will be Siemens Apogee. The Operator on duty is at the operations console and responds to calls/alarms.
    b. Some of the larger lecture halls here have a "latching" relay circuit that is tied in to the MS 2000 system (EMS) for lighting. Through the EMS, the Operator sets times that the lecture hall lighting can be controlled locally (lighting circuit enabled). Students/instructors/staff can turn lights on and off at that time. When the lighting circuit is disabled, lights are off and cannot be turned on by local light switches. The EMS cannot turn lights on or off.
6. Provide illumination sensors in areas where we could take advantage of day lighting; possibly the south side of a building with large windows.

C. **Interior Lighting**

1. Night-lights: are defined as lights that remain on when other lights in room are turned off. Night-lights can be the same light required for

emergency egress lighting. Provide night lights in the following areas:
   a. Lecture halls
   b. Corridors and hallways
2. Emergency Lighting: provide lighting on emergency power at the following areas:
   a. At Data/Comm equipment closets.
   b. At Security equipment closets.
   c. Stairwells.
   d. Pump rooms, mechanical rooms, electrical vaults, electrical closets
   e. Restrooms.
   f. Any required emergency egress lighting.
   g. Where emergency lighting is required in laboratories by Code, override wall switches shall be provided *only if* an emergency power relay is also provided to initiate the emergency lighting in case of power outage.
3. Interior Fixtures
   a. Electronic Ballasts – shall be instant start high frequency.
      i. Advance is an approved manufacturer.
   b. Whips must be 1/2" minimum.
   c. On all fluorescent lamps that are exposed, provide lamp guards. (Typically in mechanical and electrical rooms).
   d. Lighting fixtures installed in accessible ceilings shall be connected with an individual fixture tail to a nearby lighting outlet junction box.
      i. "Daisy chaining" fixtures will only be allowed on fixtures in non-accessible ceilings.
   e. Lighting fixtures shall not be suspended with jack chain: 3/8" all-thread rod shall be used.
   f. Rows of suspended fluorescent fixtures shall be mounted on a continuous 1-1/2" unistrut (or equal) channel.
      i. Individual sections of continuous rows of support channel shall have mechanical splicing connections installed.
      ii. Minimum 3/8" all-thread rod shall be used to support the channel.
   g. Ballasted type lighting fixtures shall have a disconnecting means on the line side of the ballast.
      i. Approved switches or quick-connect devices may be used.
   h. Lay-in type fluorescent fixtures installed in lift-out ceilings shall be supported independently of the ceiling grid by a minimum of two #9 galvanized ceiling wires.
      i. Support wires shall be securely attached to the fixture at diagonal corners.
      ii. Anchors and pins used with powder activated guns are not permitted for wire support to structure.
   i. The use of T12 magnetic ballasts is not allowed per DOE regulations.

## D. Exterior and Site Lighting

1. Transitional lighting provides a gradual light level change from a brightly lit area to a dark area.
2. Lights will be turned on by a timer or photoelectric eye.
3. Multiple zones shall be used.
4. Primary entrances and exits should have adequate lighting. A minimum of five (5) and not more than ten (10) foot-candles will be provided.
5. Pedestrian paths or sidewalks should be lit to avoid any dark areas. A minimum of five (5) foot-candles will be provided.
    a. Street lights
        i. Concrete standard height: 3 ft.
        ii. Pole height: 30 ft.
        iii. Pole color: Aluminum Cobra Head or bronze box fixture
        iv. Lamp: Metal halide
6. Parking lots to be provided with adequate lighting. Three (3) foot-candles will be provided.
    a. Parking lot lights
        i. Concrete standard height: 3 ft.
        ii. Pole height: 40 ft. (maximum). 40' poles are not to be used near the edge of campus or near living quarters.
        iii. Pole color: Galvanized
        iv. Lamp: Metal halide
7. Photocells - For control of exterior lighting when approved.
    a. For buildings that have accessible roofs, photocells should be installed at the northwest most corner of the building, adjusted to face true northwest.
    b. For buildings which do not have accessible roofs, photocells should be installed at the northwest most corner of each building, adjusted to face true northwest, at 10-feet above grade for 3-story buildings, and below the soffit for 1-story buildings less than 10-feet in wall height.
8. Light poles are 1000-watt metal halide.
9. Wall packs are 250 to 400 watt metal halide.
10. In concrete standards for street lights, 12"x12"x4" curved lid J-boxes shall be provided.
    a. J-boxes shall be temporarily attached to concrete form before standards are poured.
11. Examples of fixtures installed on campus recently:
    a. Rec-Wellness – box light fixture with 10" arm, 250 watt, metal halide, 480 volts, on 20' square steel pole with dark bronze finish. Cooper Lighting (HRHammer #MH-HR-R3-250-MT) on 20' SSS series pole (#SSS4A20SF).
    b. Margaret Tobin street lights - 400 watt, metal halide, 480 volts, 30' square steel pole, Spaulding # (SEII - M400 - III) on 30' SQS series pole.
    c. Paseo Pole Lights - 250 watt, metal halide, 120 volts, on 14' square steel poles, Spaulding # (CDS - IF - M250 - VS - DBZ) on 14' SQS series pole.
    d. Facilities Services and Convocation Center wall packs - 70 and 100-watt metal halide, Hydrel series 7000 fixture.

e. Cobra-Head Street Lights – GE #M4RR40S5A1GMS2, mounted on Lexington #2708-40705T4 28' round tapered aluminum pole with satin finish and with mast arm#1MA0632H 6' tapered with satin finish

E. **Lighting Levels**: For the purposes of lighting discussion the following minimum measured foot-candle levels can be used:

1. General Offices: 25 / 50 / 75
2. Hallways, Stairs, etc.: 10 - 20
3. General Classrooms: 50 Minimum at seats / 100
4. General Labs: 50 / 100
5. Public Restrooms: 30
6. Building Entrances: 30
7. Public Areas, Outdoor: 3
8. Parking Lots: 3
9. Outdoor Sidewalks and Footpaths: 1
10. Roofs: none

(These references assume dual switching for "/" numbers and are minimum point measurements for existing facilities. They are not IES average maintained equivalent spherical illumination levels.)

F. **Illuminated Exit Signs**

1. Exit signs must be viewable at each required exit path.
2. Exit signs are required where occupancy load requires 2 separate exits.
3. 100' spacing is the maximum distance that signs can be placed.
4. Placement/type of exit sign should be coordinated with furr-downs so that viewing of fixture is not blocked.
5. Install low energy consumption or LED exit signs in lieu of incandescent exit signs.
6. Self-luminous tritium-containing exits signs are not allowed.

G. **Crawlspaces**

1. At crawlspaces, lighting fixtures should not be evenly distributed throughout the sub-floor; they will only burn out and never be re-bulbed. Provide adequate lighting along routes of equipment, piping and ductwork.
2. Switches for lighting at crawlspaces should be 3 or 4 way switches located at access point into crawlspace. If access point is from level above, provide switches at level above.
3. Provide light fixture above access to crawlspaces.

H. **Bulbs**

1. UTSA stocks 750 Alto lamps.
2. Use "Edison Base" on all down light compact fluorescents.
   a. 2, 3 or 4-pin are not acceptable.

I. **Lighting Controls**

1. **General**
   a. Microprocessor-based proprietary lighting systems must provide an open protocol (BACnet, Modbus, etc.) that is compatible with the existing Siemens "Apogee" campus

monitoring system.

2. **Exterior Lighting Controls**
   a. Grasslin Digi 20 Series or approved equal, with the following features:
      i. 24 hour and 7 day programming
      ii. 10 ON and 10 OFF setpoint programs
      iii. 4 block programs (allowing for selection of any combination of days) for different weekday schedules
      iv. LCD displays time of day in AM/PM or military time format
      v. Load status indication
      vi. Daylight time adjustment key
      vii. Time switch is programmable to the minute and also offers a manual override for ON or OFF to the next scheduled event or for permanent ON/OFF/Automatic.
      viii. Reserve power is provided for a minimum of 7 days with built-in rechargeable batteries which need not be replaced.
      ix. The time switch is also surface, DIN rail, or flush mountable and is available with a NEMA 1 indoor or NEMA 3R outdoor enclosure

3. **Interior Lighting Controls**
   a. Where occupancy sensor lighting controls are specified, devices should be set to activate within 5 seconds of a person entering the room the device is in, and to deactivate after 30 minutes of inactivity in the room.

## 11. Lightning Protection Systems

A. Lightning protection shall be provided for all buildings, garages and other structures exceeding 1 story above grade.

B. Lightning protection installer should coordinate bonding to down conductors, to building counterpoise and ensure proper integration with main building electrode system.

C. Master label is required.

## 12. Surge Protection Device

A. Surge protection device (SPD) shall be UL1449 3rd Edition "Type 1" or "Type 2" Listed and UL1283 Complimentary Listed.

B. SPD shall be mounted external the switchboard(s), distribution panel(s), branch panel(s) and/or load center(s), per local codes, NEC 2008 Art.285, and IEEE 1100-2005 section 8.4.2.5.

C. The per mode surge current rating, and the UL1449 3rd Edition voltage protection rating (VPR) shall not be less than described on the following chart unless the riser, one line or panel schedule indicates otherwise.

| LOCATION | Surge Current Rating per Mode | UL 1449-3rd Ed. VPR 208Y/120v / 480Y/277v | Modes of Protection |
|---|---|---|---|
| Service Entrance | 250,000 amps | 900v / 1200 | L-N, L-G, N-G |
| Distribution Panels | 150,000 amps | 900v / 1200 | L-N, L-G, N-G |
| Branch Panels | 100,000 amps | 900v / 1200 | L-N, L-G, N-G |

D. The SPD integral monitoring shall be LED Status indicators, and dry contacts. The service entrance devices shall have LED Status indicators, dry contacts, a surge event counter with re-set, and audible alarm with silence switch.

E. The SPD connectivity shall be via a dedicated 3-pole breaker, sized per the SPD manufacturers installation instructions.

F. Enclosure: The SPD shall have a NEMA rating of NEMA-4 or a NEMA rating equal or greater than the connected switchgear or panel that is being protected.

G. SSCR or AIC: The SPD shall have a minimum SCCR rating of 100k AIC or greater than that of the connected switchgear or panel that is being protected.

H. The SPD shall have a warranty of not less than 10 years form original date of shipment. After proper installation, the warranty shall not be pro-rated and shall cover manufacturing defects, workmanship, or any end-of-life event including lightning.

I. Approved manufacturers are, Thor Systems, Current Technology, and Liebert.

J. SPD's with test ports shall be delivered with testing equipment and test training shall be provided to the project owners at no additional charge.

## 13. Wiremold

A. Power supply shall enter wiremold through a 4"x4" field cut-out in the back of the raceway. Cut out shall mate up with a 4"x4" junction box in the wall.

B. Wiremold raceways longer than 4 feet shall be provided with one spare conduit from an accessible location into wiremold. Spare conduit shall be for future use, and shall be empty at the time of substantial completion.

*Division 27*

# Communications

## 1. Structured Cabling System

A. **General**

1. As part of the construction project, provide raceway systems and boxes for all telephone, data, digital and analog communications devices and systems. Data and voice systems must be separated from all other systems by separate metal raceways.
   a. Infrared data communications systems are not allowed.
   b. UTSA Office of Information Technology (OIT), the final campus authority on all structured communications systems, will provide separate detailed Technical Requirements to all project design professionals that contains minimally acceptable telecommuni-cations architecture fundamentals for project incorporation.
2. Equipment and Telecommunications Rooms (formerly known as Main and Intermediate Distribution Frames, respectively) will be established and connected by permanent pathways using cable tray and/or conduit. At each telecommunications room adequate premise equipment and associated hardware – patch panels, punch-down blocks, racks, cabinets, cable management, etc. - shall be installed to transition between individual device cabling and bundled cabling. Bundled cabling will be extended in 4-inch conduit filled with a 3-compartment flexible fabric innerduct system, unless otherwise specified, between demarcation point and communications closet designated by UTSA OIT. Contractor shall provide one spare conduit for each 2 conduits installed.
3. On all UTSA projects impacting the UTSA network, the A/E firm is required to secure the services of a telecommunications designer who is a certified Registered Communications Distribution Designer (RCDD) with a minimum 5 years of design experience.
   a. The RCDD is responsible for familiarizing himself with the complete UTSA Design & Construction Standards as well as the OIT Technical Requirements
4. Installer shall provide and install all voice and data system wiring, cabling and associated equipment and components to provide a complete structured telecommunications cabling system. The UTSA communications cable plant is an Industry Standard Category 6A (10Gig) Structured Cabling Plant in support of the data network system.
5. Installation shall be performed by a Systimax Business Partner certified installer in accordance to Systimax GigaSPEED X10D Design & Installation Guidelines.
   a. The installer must have a Registered Communications

Distribution Designer (RCDD) on staff with a minimum 5 years of experience, have been in business for a minimum of 5 years and can certify all installations are warrantable for no less that twenty (20) years.

b. The installer will be expected to provide proof of prior experience with projects of similar scope and size upon request by UTSA. Past performance with UTSA OIT is a selection criterion.

c. Installations accomplished by departments and contractors outside the supervision/participation of OIT and without proper certification credentials will not be allowed to connect to the UTSA network system.

6. Installations, including parts and labor, will be in accordance to EIA-TIA/ANSI/TIA-568-C.2 standards and all other regional/national codes, standards, laws, ordinances, rules, etc., in effect unless exceptions are provided in writing from UTSA OIT.

7. Voice, data and video outlets located inside rooms of the building shall be installed at 18 inches above finished floor (typical). Provide a 4 – 11/16 inch square box with a single device plaster ring, and a 1 inch conduit with pulling line, extended to the nearest cable tray or communications room, or extended to the nearest communications room, depending upon project requirements. Where outlet is located at a different dimension AFF, the plan symbol will indicate accordingly. Encountering project constraints and overhead ceiling congestion, a 1" conduit stubbed out above the nearest accessible ceiling space will be acceptable with UTSA OIT concurrence.

8. Voice, data and video outlets located outside facilities shall be installed at heights above finished floor generally equivalent to height of device being served. Provide a 4 – 11/16 inch square box with a weatherproof cover, and a 1 inch conduit with pull line, stubbed to the MDF/IDF or cable tray so the cabling can be routed for termination. Where multiple voice, data or video devices are located at the same point, one 1 inch conduit can be provided for a maximum of 4 cables. RG6 video cable shall be installed in a separate 1" conduit raceway to its origin.

9. Any device that exceeds 295 feet from the communications closet, uses an analog signal, and is located outside the facilities can use copper cable media or one category cable lower. Exceeding 295 feet on any horizontal cable requires written approval from UTSA OIT.

10. Provide a wall-mounted telephone outlet inside the entrance of every lab, or if an office is inside of the lab, the phone can be a standard office telephone only. Going across a hall or into an adjoining lab for a telephone is not acceptable.

11. One telephone and one data drop are required for the main (central) mechanical/pump room. If there are isolated/difficult access mechanical/electrical spaces, such as penthouses, these will require an additional phone line. Multiple "main" mechanical/pump rooms in a large facility may require a telephone for each "main" room. Electrical spaces do not typically require a phone line. Multiple small mechanical/electrical spaces within a complex, such as housing, do not require phone lines.

12. Cable drops for other spaces are as follows:
    a. One voice and two data drops are required in faculty, staff and part-time student offices/areas.
    b. Voice, data and wireless for labs, classrooms and lecture halls will be determined during design.
    c. Lecture halls will also have a dense wireless cabling installation to support wireless device installations.
13. Access panels or other means of access are required every 20 feet in ceilings that exceed a 20 foot dimension per OIT maintenance. Access panels shall be 24"x24".
14. Other discipline system wiring – HVAC control cables, security door locks and card readers, fire alarm A/V cabling, etc. – shall not be routed in the same cable tray, conduits or sleeves as IT cable.

B. **Voice and Network Service Cables**
1. Provide cables and outlets to pay-to-park stations, kiosks, money stations, registers, pay-to-use copiers, UTSA Network printers, security cameras, emergency phones ("Blueboys"), elevators or any other noted "service-areas" requiring UTSA Network and voice services.
2. Provide Infrastructure cable, conduits, pathways and outlets for wireless systems.
    a. Wireless Access Point (WAP) cable termination locations above ceiling shall be identified with a purple adhesive dot.
    b. All WAP cables shall be terminated on the first 8 ports of each patch panel (typical) and when necessary additional patch panels provided to accommodate the total WAP count.
    c. WAPs located outside of buildings must be grounded.

C. **ADA Compliance**
1. Assistive Listening Devices – UTSA Disability Services provides portable assistive listening devices to UTSA students who have registered for disability services and quality for this service. The devices are battery operated, so no accommodations are required as part of construction projects.

D. **Equipment/Telecom Rooms** (see Appendix C for layouts)
1. Rooms shall be stacked and located in the center of the building and not located adjacent to any electrical or mechanical spaces.
    a. MDF/Equipment Rooms shall be 20'x20'.
    b. IDF/Telecom Rooms shall be 12'x12'.
    c. Rooms will not have drop ceilings nor carpet (VCT preferred). Cutting out of decks is not allowed.
    d. Access to rooms shall be via card reader and UTSA PD key core.
2. Do not mount electrical panels or junction boxes, mechanical equipment, HVAC equipment, security equipment (DSX, servers, etc.) or fire alarm panels, controls or equipment inside of Equipment/Telecom rooms. Equipment/Telecom rooms are to be segregated from all other disciplines and equipment.
3. Telephone outlets shall not be placed inside of Data/Comm rooms.
4. Provide 4 to 6 (depending on the number of floors) four-inch (4")

conduit sleeves with fire stopping at floor of room, locate as directed. Each sleeve is to extend 5 inches above finished floor (+/- 1 inch). Each sleeve is to be grounded via grounding collars back to ground bar.

5. Provide 24-hour air conditioning. HVAC redundancy is required in all MDF/IDF rooms; emergency power is preferred. Split units shall be mounted over doorway.
   a. Temperature range: 65-73 degrees F, positive pressure
   b. Humidity: 30-55%, dust < 100 micrograms/$m^3$/24 hour period
6. Room walls shall be lined with ¾" fire-rated plywood, painted white fire retardant paint both sides from 1' to 9' a.f.f. Electrical outlets are to be provided per Appendix C.
7. Lighting is to be fluorescent, 70 fc minimum at 8'-6" a.f.f., switched with a motion timer .
8. Each MDF and IDF will include a copper-grounding bar as per Appendix C.
9. In buildings that have emergency electrical generators, MDF and IDF rooms will have emergency power provided.
10. Outside service providers are not part of the UTSA network infrastructure and must be stand alone. UTSA OIT will engage during design for placement of this equipment and its components.
11. Racks shall not be anchored to the floor.
12. Provide a minimum of one 2" sleeve in corridors leading to office spaces, and one 4" sleeve into labs, classrooms, MDF/equipment and IDF/telecom rooms and provide appropriate fire stop protection.
13. A centralized UPS is required for all MDF/IDF equipment.

E. **Cable Specifications**

1. Data cable shall be plenum rated, bright blue in color and Commscope/Systimax approved.
2. Voice cable shall be plenum rated, white in color and Commscope/Systimax approved.

F. **Laptop Computer Charging Stations**

1. Provide standard 110V duplex or quadraplex electrical receptacles (depending upon seating) in public open spaces near "services" such as food court, gathering areas (Sombrilla), study spaces and other areas of similar congregation.
2. Placement criteria would include, out of the weather, away from noise and dust, near seating, at counter or table height, and away from any other unsafe areas.
3. Quantity and spacing is a function of area size and room usage.

G. **Acceptable Products (Systimax Warranty)**

1. The below represents some of the current minimally acceptable equipment and IT products to be used on projects. Proposed equivalent items must meet or exceed the specifications of the listed item to be approved by UTSA OIT. Additional equipment is indicated in the separate OIT Technical Requirements.

| Item | Product | Model Number |
|---|---|---|
| Fiber Optic Cable | 9/125 um single-mode | C/S 760018630 |
| | 50 um multi-mode OM 3 300 mm | C/S |
| Copper Cable | Multi-pair count UTP (white sheath) rise pl white | Commscope cat 5e |
| | 4-pair 6A UTP – voice (white sheath) | C/S GigaSPEED X10D-2091-white |
| | 4-pair 6A UTP – data (blue sheath) | C/S GigaSPEED X10D-2091-blue |
| | 4-pair 5E UTP – voice (white sheath) | C/S 2061-white |
| | 4-pair 5E UTP – data (data sheath) | C/S 2061-blue |
| Fiber Optic Termination | Connectors (ST) | C/S SM700011067 |
| | Connectors (SC) | Contact UTSA OIT |
| | Connectors (LC) | Contact UTSA OIT |
| | Fiber Optic LIU | C/S PN 600G2 – 24 port 1RU |
| | Fiber Optic LIU | C/S PN 1000G2 – 144 4RU76010155 |
| | Fiber 6 port ST SM fiber panel | Systimax 76109447 |
| Copper Termination | Primary Copper Protectors – gas tube light, prot | Circa PN 1880ECA1-100 |
| | Gas Tubes | Circa PN C4B1E |
| | Info Outlets - Orange jack for data cat5e | C/S PN MPS100E-108232703 Orange |
| | Info Outlets - Ivory jack for voice cat5e | C/S PN MPS100E-108232737 Ivory |
| | Info Outlets - Orange jack for data cat6a | C/S PN 760092379 Orange |
| | Info Outlets - Ivory jack for voice cat6a | C/S PN 760092411 Ivory |
| | Info Outlets - Faceplates | Ivory Modular "M" series |
| | Info Outlets - Dust covers | Systimax M0AP-246 Ivory |
| | Info Outlets - 24-port angled patch panel | C/S PN 760049957 |
| | Info Outlets - 48-port angled patch panel | C/S PN 760049965 |
| | Info Outlets - 48-port flat patch panel | C/S PN 76004994 |
| Equipment Room Build-Out: Ladder Rack | Universal cable runway (18"W) | Chatsworth PN 10250-718 |
| | Runway radius drop, cross member | Chatsworth PN 12100-718 |
| | Runway radius drop, stinger | Chatsworth PN 12101-701 |
| | 18" ladder rack e-bend | Chatsworth PN 10822-718 |
| | 24" triangular support wall bracket | Chatsworth PN 11746-724 |
| | Cable runway elevation kit | Chatsworth PN 10506-706 |
| Equipment Room Build-Out: Equip. Rack | Standard rack (19"Wx7'Hx3"D) | Chatsworth PN 55053-703 |
| | Over top rack holder kit | Chatsworth |
| | Horizontal mount power strip (8 outlet, 19") | PN 12816-701 |
| | Cabinet system (36"Hx30"D) | CUBE-iT Plus PN 12419-736 |
| | Fan for cabinet system | CUBE-iT Plus PN 12804-701 |
| | Filter kit for cabinet system | CUBE-iT Plus PN 12805-701 |
| | Power strip for cabinet system | CUBE-iT Plus PN 12820-701 |
| Equipment Room Build-Out: Wire Mgmt. | (Verify all vertical manager sizes) Horizontal managers | Panduit PN NMF2 |
| | Vertical managers | Panduit PN PRV 6 |
| | Vertical managers | Panduit PN PRD 6 |
| | Vertical managers | Panduit PN PRV 8 |
| | Vertical managers | Panduit PN PRD 8 |
| | Vertical managers | Panduit PN PRV 10 |
| | Vertical managers | Panduit PN PRD 10 |
| | Vertical managers | Panduit PN PRV 12 |
| | Vertical managers | Panduit PN PRD 12 |
| Equipment Room Build-Out: Fire Rating/Stop | Fire rated caulking/putty | FP-3M-MPP-4S |

| | | |
|---|---|---|
| | Fire rated pillows | FP-3M-FBP-2-4 |
| | EZ-Path | PN EZDP433GK |
| | Fire stopping with mounting bracket | 3M PN FSP-QPS-4, w/ PN FSP-QPS-4BRKT |
| | Fire barrier moldable putty | 3M PN FSP-MPS 78205149346 (stick) |
| | Fire barrier CP-25WB+ caulk | 3M PN FSP-BC-25 78205149344 |
| Equipment Room Build-Out: Cable Support | Cable support system | Panduit J-Pro, 2" & 4" |
| | J-Hook system | Erico Caddy Cat, 2" & 4" |
| Equip. Room Build-Out: Surf. Mtd. Raceway | Wiremold module frame | PN ALA-2A |
| | Wiremold module frame | PN ALA-DR |
| Equipment Room Build-Out: Fasteners | Tie Wraps/Fasteners | Panduit, Erico |
| Ground Bus Bars | BICSI & ANSI/EIA/TIA 20" TMBG | Chatsworth PN 40153-020 |

H. **Testing & Close-Out**

1. All testing shall conform to ANSI/TIA/EIA regimens as described in sections 568C.3 (fiber optic cable links & cabling), 526-14A (field test equipment for multi-mode fiber optic cable), 526-7 field test equipment for single-mode fiber optic cable), and 455-50B(light source launch requirements) as well as that described in the specific project specifications.
2. All strands within a cable sheath (including Cat 6A) must pass the testing regimen. Failure of any portion of cable, links, equipment, etc., shall be diagnosed and repaired by installer.
3. All testing results for intra-building fiber optic cabling and inter-building fiber optic cabling, structured cable system warranty and communications cable plant record drawing (both hard copy and AutoCAD version) shall be provided to UTSA OIT.

## 2. Clock Systems

A. **Atomic Clocks**

1. The preferred clock system for the UTSA campus is atomic clock. There may be areas of the campus which cannot receive the wireless synchronization signal to properly maintain the correct time: the responsibility of this verification will fall with the A/E design team and general contractor. If this verification cannot yield an assurance that this will not be a problem, UTSA will default to the previously established digital clock system as delineated below.

B. **Existing System**

1. Extension of the campus wide 120 Volt, synchronous wired central clock system is required for most projects.
2. The existing system shall be modified and converted to provide Digital BCD Clock correction signaling into new buildings. Work involved includes master clock modifications, installation of campus wiring from the master clock to the new building, conduit and local 120VAC wiring and Digital Clocks where indicated on the plans. When no problems with reception of wireless synchronization signals have been assured, UTSA requests atomic clocks.

3. The campus is presently equipped with a Master Clock System, which provides a synchronous control circuit into each building, which currently contains indicating clocks. The point of access to the system will be from the existing master clock system located in the Physical Plant Building.
4. Intercept and extend the existing synchronous circuit from the existing master clock. Verify with equipment supplier all existing clock control circuits and new requirements for proper interface.

C. **General**

1. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
2. Approved manufacturer: Simplex.
3. The Clock System for this building shall provide 4" Digital Clock Assemblies, where it is found that atomic clocks cannot receive the wireless synchronization signals. Provide Simplex 6334-9142 Celestra 2000 series Digital Clocks. The clock shall be constructed of a high impact, flame retardant, molded case, with a display brightness switch. Clocks shall be provided with the necessary brackets and hardware for mounting as a surface unit, bi-directional wall or ceiling unit. Clocks shall include the following features and accessories:
    a. Instantaneous correction
    b. 4" LED Display
    c. Amber color display
    d. Surface, Single and Double mount hardware (interface back-box) as indicated on Plans.
    e. Mounting to Standard Electrical Boxes.
    f. Mating connectors, plugs and receptacles as required.
    g. Clocks shall be UL listed.

D. **Component Equipment:**

| | | |
|---|---|---|
| 1. | Clock, single face: | Simplex 6334-9142 |
| 2. | Clock plate, wall mount: | Simplex 6334-9802 |
| 3. | Line Amplifier | Simplex 2301-9513 |
| 4. | Clock Correction Code Converter | Simplex 2320-series |

E. **Wiring**

1. One pair, twisted shielded, 18 AWG from master clock and 120VAC, local power to clock.

*Division 28*

# Electronic Safety & Security

## 1. Security Systems

A. Refer to Appendix D: "Security System Standards" for requirements as prepared by the UTSAPD.

B. **General**

1. On all UTSA projects impacting campus security, the A/E Firm is required to secure the services of a Security Consultant.

C. **Alarms**

1. Alarm points will be placed in the following areas:
   a. exterior entry and exits
   b. roof hatches/doors
   c. inner doors located in security sensitive areas
2. Sliding Doors
   a. Doors will be activated via a dry contact supplied by Security Installer. Sliding doors need to be outfitted with connections for Door Contacts and CR control. Electric strikes are not required.

D. **Emergency Intercoms**

1. Emergency intercoms shall be placed in the following areas:
   a. parking lots (Blue-Boy Emergency Intercom at Parking Lots)
      i. White colored letters for "EMERGENCY"
      ii. Black for "Assistance"
   b. late entry doors

E. **Cameras**

1. Fixed position cameras shall be placed at the following areas:
   a. at late entry doors
2. Cameras with telemetry and pan 360 degrees shall be placed at the following areas:
   a. exterior of the building
   b. parking lots
   c. other internal areas as designated in the program
3. Provide a dedicated/unswitched 120V source at each camera location. Box should be located in an accessible area above ceiling near camera location. If exterior camera, box should be on inside of building.

F. **Card Readers**

1. Access through late entry doors will be accomplished by card reader and electromagnetic lock, with remote release by police dispatch.
2. At hollow metal door frames and aluminum door frames, mount card

readers on frame.

3. Where card reader cannot be mounted on doorframe, install single gang junction box, not double-gang. Include Stainless Steel Cover Plate.
4. UTSA installs card-key access on all doors from public corridors into research labs. We do this to be able to control access (who is allowed in) and generate an audit trail (what card was swiped at what time) in case there is ever a breach of security. The researcher cannot determine how access control is managed; labs shall be locked down 24/7. Researchers and their staff are required to carry and use their access cards.

G. **Security Equipment Room**

1. Provide a secure room, or area only accessible to Police inside of a larger room, to house the Video Surveillance Control System.
2. Approximately, 75 square feet will be required to house equipment.
3. All Video/Intercom wiring should terminate at this location.
4. Provide 24-hour air-conditioning.
5. Provide 4 duplex electrical, 3 data drops, 1 voice.
6. Provide fiber from this room to MS Building Police Department. The fiber is to consist of six (6) strands of single mode.

## 2. Fire Alarm Systems

A. **General**

1. Fire alarm systems are required in all facilities that have an occupant load of greater than 100 occupants above the level of exit discharge.
   a. For Business Occupancy, an occupant load factor of 100 requires a fire alarm system for facilities with 10,000 square feet of space above the exit level.
2. If a fire alarm system is installed in the facility, visual alarms are required to be installed in accordance with the Americans with Disabilities Act (ADA). Drawings should note that fire alarm systems are designed in compliance with applicable code requirements.
3. A licensed installer must certify all new and modified fire alarm systems.
4. Fire alarm systems should not be installed in crawl spaces or roofs.
5. Fire control rooms are not required in buildings 4 levels or less.
6. Locate fire alarm control panels convenient to the primary entry to the building.
7. All fire alarm conductors are to be run in EMT conduit with compression fittings.
8. Approved System:
   a. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
   b. Approved manufacturers: Simplex, Siemens, if building is new OR to match manufacture of system currently in subject building (if renovation).
   c. Centrally monitored fire alarm system.
      i. Each building will be provided with fiber connection

for remote monitoring of the system. This involves installation of fiber optic cable from the new building to the closest fire alarm control module that support the graphics interface and setup of graphic control center (located at Operations & UTPD) for monitoring/response. This system provides remote monitoring of fire alarm systems.

9. Testing and Inspections
    a. Systems that have been tested and inspected are required to have inspection certification tags installed prior to substantial completion. The white installation sticker date must indicate the approved substantial completion date that shall also duplicate as warranty start date. If provided, a green tag shall be as per requirements.
    b. Fire alarm system must meet Texas State Fire Marshal requirements as defined by Texas Administrative Code.
    c. UTSA requires the labeling per TAC 34.6 Fire Alarm Rules, 34.620 Installation and Service Labels.
10. Warranty
    a. Warranty period for fire alarm systems shall coincide with the contractor's general warranty, a 1-year period.

B. **Smoke Detectors**

1. As a general rule, smoke detectors are not required in an Business or Higher Education Occupancy (UBC Classification B-2). However, UTSA has decided to provide smoke detectors in selected locations.
2. New smoke detectors will be tied into existing fire alarm system, and will initiate general alarm upon activation.
3. Ceiling mounted smoke detectors generally should be spaced a maximum of 30 feet.
4. All laboratory spaces will be provided with ceiling mounted smoke detectors. Smoke detector will be tied into existing fire alarm system, and will initiate general alarm upon activation.
5. All custodial closets will be provided with ceiling mounted smoke detectors.
6. All storage closets will be provided with ceiling mounted smoke detectors.
7. Photoelectric type smoke detectors will be used in all applications, whether ceiling mounted or interior-duct mounted.
8. Beam detectors as part of building fire alarm systems shall be Systems Sensor BEAM 1224S.
9. Duct smoke detectors shall provide for supervisory function only and are not to be used for general building alarm initiation/evacuation.

C. **Pull Stations**

1. Manual dual action pull stations are required at each exit on each floor in the normal path of exit.

D. **Visual Alarms**

1. All rooms, except for private offices, are required to have visual alarms.
2. Visual alarms inside of a single room can be spaces so that from any

point in the room to the alarm does not exceed 50 feet.

3. At corridors, spacing should not exceed 100 feet on center. Alarms must be located no greater than 15 feet from ends, "L's" and intersections of corridors.
4. Fire alarm systems are designed in compliance with NFPA 72, and therefore, audio-visual devices can be mounted between 80 and 96 inches above finished floor to center of lens. Coordinate locations with marker boards, artwork, bookshelves, etc.
5. Don't locate devices above equipment if there are other options.
6. At Offices and similar spaces that will have furniture that can be arranged in various layouts, locate devices to door wall so they won't be blocked by furniture.

E. **Audible Alarms (Horns)**

1. All rooms must be within 100 feet of an audible alarm.
2. At corridors, spacing should not exceed 100 feet on center.

F. **Audible Alarms (Intercom)**

1. Major buildings will utilize and intercom/audible alarm system throughout.
2. Placement of devices must be made to ensure intercom messages are heard in every space.
3. Any assembly occupancy with an occupant load exceeding 300 is required to have ceiling mounted speakers and intercom communications.
4. University classrooms exceeding 6,000 square feet will have an occupant load exceeding 300 (20 net SF per person). Conference rooms exceeding 4,500 square feet will have an occupant load exceeding 300 (15 gross SF per person).

G. **Fiber Optic Networking**

1. The 6-strand fiber is multi-mode 62.5/125 um, Amp or CSC part #1-1664040-1 for riser, #1-664041-1 for plenum for indoor use and #1-664216-5 for outdoor use.
2. The fiber used between buildings and connection points is for/to a 12-strand multi-mode fiber per a fiber optic patch panel (PDP 012-CB3510/25) as manufactured by Berk-Tek – Amp/CSC as local suppliers.
    a. The Amp or CSC part numbers for the 12-strand fiber are: #1-1664052-1 for riser, #1-664053-1 plenum for indoor, and #1-664222-5 for outdoor.
    b. Connectors are ST Light Crimp, CSC #780158
    c. The inter-duct used between buildings is 1" red smooth wall SDR11 (CSC #745392)
3. All fiber terminations are to be connected by fire alarm system representative.
4. All spares are to be connected or have connectors for future use.
5. Fiber strand color coding should match the existing campus backbone of the dedicated network cabling used for the UTSA campus fire alarm system. The cable jacket color coding currently use on campus is as

follows:

a. Red
   i. 18 x 2 shielded – MAPnet/ID net
   ii. 18 x 2 non-shielded – zones
   iii. 14 x 2 non-shielded – power
   iv. 14 x 2 non-shielded – relay

b. Yellow
   i. 18 x 2 shielded – speakers
   ii. 14 x 2 non-shielded – horns/chimes only

c. Blue
   i. 18 x 2 shielded – phones
   ii. 14 x 2 non-shielded – audio/visual devices

d. White
   i. 14 x 2 non-shielded – strobe only

e. Black
   i. 18 x 2 shielded – network/data/annunciator
   ii. 14 x 2 non-shielded – door holders

6. All fire alarm system networking shall be back to previously established building IP addresses – scattering of IP addresses throughout campus buildings will NOT be allowed.

## 3. Facility Control & Management Systems (FCMS)

A. Siemens requires an ether link connection (data) with IP address provided to Siemens/FCMS (via Moses Gomez), as assigned by UTSA-IT department.

B. Simplex campus fire alarm system has a dedicated campus fiber-backbone. No UTSA-IT department connections or support needed unless infrastructure dictates otherwise; in which UTSA-IT provides a minimum of four - 4 multimode "dry " fibers thru IT - LIU termination. (In this case Simplex would provide the four-(4) multi-mode fibers (2-spares included) to the LIU panel with "ST " connectors to IT closet for IT dept. labeling and connection.)

C. **Abbreviations**

1. LIU = Lightguide Interface Unit
2. ST = Multimode type connector
3. IP = Internet Provider
4. CV = Chaparral Village
5. IT = Information Technologies
6. FCMS = Facilities Controls and Monitoring Systems

*Division 31*

# Earthwork

## 1. Site Clearing

A. Take all measures necessary to protect trees from construction damage and keep them healthy during the construction process. This includes trees inside construction fences and adjacent to any construction activities.

B. If topsoil is found, it cannot be reused unless it is approved by the Owner.
   1. If found acceptable, it should be stripped and stockpiled for use in landscape work.

C. Fill any depression caused by clearing and grubbing operations; removing any improvements, over or underground, as necessary to facilitate new construction.

D. Disposal will be done legally; no burning is permitted on University property.

E. A certified arborist shall perform all pruning. Contractor shall submit proof of qualifications and three current references to A/E and OFPC for approval prior to commencing any pruning.

## 2. Earthwork

A. **Soil Materials**
   1. Satisfactory soil materials are defined as those complying with ASTM D 2487 soil classification groups GW, GP, GM, SM, SW, and SP.
   2. Unsatisfactory soil materials are those that comply with ASTM D 2487 soil classification groups GC, SC, ML, CL, CH, OL, OH, and PT.
   3. Sub-base material: flexible base complying with Texas State Department of Highways and Public Transportation Standard Specifications Item 249, Type A, Grade 1 or 2.
   4. Drainage fill: washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1-1/2" sieve and not more than 5% passing a No.4 sieve.
   5. Backfill and fill materials: satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter and having maximum Liquid Limit Index of 40 and maximum Plasticity Index of.12.
   6. Fill retainers: precast concrete (2500# mix) at least 2" thick in convenient lengths and widths to be properly placed and secured against displacement, reinforced with 6 x 6 #10 wire mesh.

## 3. Lime Soil Stabilization

A. Lime stabilization shall be installed in accordance with the applicable provisions of Item 260 of the TxDOT Standard Specification for Construction

of Highways, Streets, and Bridges, 1993 edition, or as otherwise required by the geotechnical or structural engineer.

*Division 32*

# Exterior Improvements

## 1. Hot-Mix Asphalt Paving

A. Asphaltic concrete paving is an acceptable material for:
   1. Roadways.
   2. Parking areas.

B. Where the design requires work on an existing roadway, with permission of UT Police, one-half of the roadway can be taken out of service for limited periods of time.
   1. A flagman (or flagmen if the area is extensive) must be provided to direct traffic around the construction area.

C. Where contractor uses existing parking lots and/or roadways for staging, material laydown and access to the site, the contractor shall resurface and restriped at the completion of the project.
   1. Resurfacing may requires the complete removal of the asphaltic material and installation of new material, to be determined on a job-by-job basis.

D. Painted Striping and Symbols
   1. At accessible parking, each space will be identified with a (typically) pole-mounted single sign indicating the international symbol of accessibility at the head of the space. Van accessible spaces will be designated with additional text signage.

E. Paint applied to asphalt paving to mark parking stalls, provide directional arrows, etc., shall be white in color. Crosswalk bars shall be white in color and shall contain clean silica sand integral with the paint mixture to improve pedestrian traction. Sand shall be incorporated in a concentration recommended by paint manufacturer.

## 2. Portland Cement Concrete Paving

A. Portland cement concrete is an acceptable material for:
   1. Aprons
   2. Service yards
   3. Walks
   4. Curbs

B. Provide concrete pads at crawl spaces where access is provided by ladder to floor above.

C. Provide concrete paving in front of trash dumpsters, to eliminate destruction of asphalt paving by heavy truck tires being maneuvered.

1. Trash dumpsters will be provided at some new buildings, and will be screened from public view. Typical sizes used are as follows:
    a. Garbage – 6'W x 6'D x 8'H, with 18" minimum clearance on all sides. A 48" high platform, connected by ramp to ground level is required. Provide handrails and guardrails at ramp and platform. (10 cubic yards)
    b. Garbage – 6'W x 6'D x 5'H, 8 cubic yard slant tops for areas where ramps are not available.
    c. Recycling – 6'W x 6'D x 6'H, with 18" minimum clearance on all sides.

D. Concrete Curbs: shall be constructed using in-place formwork or shall be machine-laid. Hand formed concrete curbs is not allowed.
1. Marking of fire lanes on curbs should only occur:
    a. where driveways can be misinterpreted as parking lots
    b. where there is no clear path
2. Curbs where parking is not permitted (but is not a fire lane) shall be painted yellow.

E. Paint applied to concrete paving to mark parking stalls, provide directional arrows, etc., shall be yellow in color.

F. Paint applied to concrete to mark pedestrian traffic paths shall be yellow in color. Mark both edges of path with 4 inch stripe parallel to direction of traffic, and 4 inches wide stripes spaced 24 inches on center applied at a 45 degree angle to the direction of travel.

## 3. Pavement Sealer, Repairs & Re-striping

**A. Submittals and Specifications**

1. Submit a Product Data Sheet and Safety Data Sheet for all products and materials.
2. All work shall meet the specifications of TxDOT (Standard Specifications for Construction and Maintenance or Highways, Streets, and Bridges, 2004)
    a. Item 300 (Asphalts, Oils, and Emulsions)
    b. Item 315 (Fog Seal)
    c. Item 334 (Hot-Mix, Cold-Laid Asphalt Concrete Pavement)
3. All asphalt repairs shall be Hot-Mix, Hot-Laid.
4. Hot-Mix, Cold-Laid repairs shall be allowed ONLY with prior UTSA approval.
5. All pavement sealers shall meet or exceed the specifications of the Jennite AE Asphalt Emulsion Pavement Sealer (a product of Neyra Industries, Inc.) or approved equal. The product shall follow Application Specification NJ-S3 for high traffic volume to include three sand slurry coats of product.

**B. Surface Cleaning and Crack Filling**

1. Remove existing striping as directed by the owner.
2. Remove loose and foreign material.
3. Remove oil and grease spots that have not permanently damaged or softened the pavement.

4. All major patches, asphalt overlays, and crack repairs shall be performed prior to seal coat applications. Cracks over ¼ inch in width shall be routed, air blown clean until free of moisture, treated with weed killer (if vegetation exists), and then filled with asphalt crack sealer compatible with the asphalt pavement sealer system.
5. Completely fill cracks. Squeegee material to no more than one (1) inch wide and 1/8 inch above the pavement surface. Prevent tracking with an application of fine aggregate.

**C. Pavement Repairs**

1. Square the sides of the repair area by saw-cutting or other approved method. Cut vertical faces around perimeter of repair area. Remove all loose and foreign materials to a depth of 7.5 inches for the asphalt repair, clean, and dry the repair area.
2. Fill holes, ruts, depressions, and soft areas of the remaining pavement and thoroughly compact by tamping or proof rolling, wetting materials if necessary. Any additional soft areas that are identified shall be undercut and filled with acceptable material as directed by the owner.
3. Apply a tack coat to the cut faces and surfaces of the repair area unless otherwise directed.
4. Replace with 1.5 inches of Type D Hot Mix Asphalt over 6.0 inches of Type B Hot Mix Asphalt.
5. Finish to grade and compact to conform to the existing pavement. Compact with hand tamper, mechanical tampers or rollers as directed or approved. Compact to achieve full consolidation.
6. Repair the pavement edges to the line and grade of original pavement. Clean the roadway surface after repair operations.

**D. Materials**

1. All components of the pavement sealer shall be pre-mixed at the plant and be ready for application upon delivery. No products shall be added to the product on site without prior approval.
2. The product shall not contain coal tar emulsions.
3. The pavement sealer shall contain sand in an amount specified by UTSA.
4. Sand will be washed and graded silica sand free of contaminants.

**E. Application**

1. Rates:
   a. The first coat will be applied at a rate of 0.12 to 0.16 gal/sq yd.
   b. The second and third coats will be applied at a rate of 0.10 to 0.15 gal/sq yd.
2. The second and third coats will be applied only after the previous coat is dry.
3. Striping (or restriping) of parking lots or drive lanes shall be performed when the sealer has been completed and is dry to the touch.
4. Pavement striping shall be performed as directed by UTSA.
5. Paint shall be a conventional dry (non-heat applied) acetone based, 100% acrylic, as manufactured by Sherwin Williams or approved equal as follows:
   a. SETFAST Traffic Paint (Low VOC Alkyd), Black

b. PROMAR Low VOC Solvent Based Acrylic Marking Paint, Yellow
c. SETFAST VOC Compliant Solvent-Based Acrylic Traffic Marking Paint, Red
d. PROMAR Low VOC Solvent-Based Acrylic Marking Paint, White
e. Toluene (Toluol), as clean-up solvent

## 4. Fire Apparatus Access Roads

A. **Surface**: Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus (> 75,000 pounds) and shall be surfaced so as to provide all-weather driving capabilities.
1. Drivable grass surfaces are not permitted to be used as the primary access to the site.
2. Blue traffic reflectors shall be used to designate the fire apparatus access road.
3. Sod is not permitted to be placed over the drivable base.

## 5. Unit Pavers

A. Exterior elevated unit pavers are not allowed for use in areas subject to pedestrian foot traffic.

## 6. Irrigation Systems

A. **General**
1. Irrigation system design, installation and repairs must be conducted under the direction of a Texas Commission for Environmental Quality (TCEQ) Licensed Texas Irrigator.
   a. Evidence of licensure shall be submitted.
2. The Irrigation Contractor will not willfully install the irrigation system as shown on drawings when it is obvious in the field that obstructions, grade differences, or discrepancies in area dimensions exist that might not have been considered in engineering the design. Obstructions or differences shall be brought to the immediate attention of the Irrigation Designer/Landscape Architect. Major changes to original irrigation design shall be reviewed by Owner.
3. Contractor is responsible for capping, rerouting and repairing all existing irrigation systems that fall within or adjacent to the project site. Responsibility shall include all repairs to damages.
4. At the completion of the project, provide the following tools and equipment:
   a. Two sets of specialized tools required to remove, disassemble, and adjust each type of sprinkler or valve in the project.
   b. Two keys for each automatic controller.
   c. Two service manuals for all equipment, including controllers.
   d. Record drawing of the system as installed based on "as-built" record set of prints maintained on site.
5. Tests, Inspections and Final Acceptance
   a. Provide a minimum of 48 hours notice (not including holidays and weekends) for all required tests and inspections.
   b. All items of work that will be buried are required to be inspected by UTSA prior to covering.

c. Provide static pressure test for irrigation main lines. Test shall require maintenance of pressure for a 24 hour period.
d. Final acceptance of irrigation system includes confirmation of area of coverage by system and operating pressure at furthest head.

B. **Products and Materials**

1. **Piping**
   a. Main / Pressure Lines: Schedule 40 PVC. Do not use flexi-pipe. No mainline under 2".
   b. Laterals Lines: Class 200 Pipe, 3/4" or larger. Do not use 1/2" size piping.
   c. PVC Sleeves – Non Pressurize buried sleeves shall be Schedule 40 PVC.
2. **Control Wiring**
   a. Common wire – white (14/1 AWG-UF); active electric valve wires – red (14/1 AWG-UF); Minimum of two (2) extra wires – green (14/1 AWG-UF) to be run to furthest electric valve from Controller. Additional extra wires may be required, as per overall scope of system design.
      i. Splice box to Controller – red wire (18/1 AWG-UF)
   b. Wiring to occupy same trench and installed along the same routes as pressure supply or lateral line, where possible. Where more than one wire in same trench, wiring will be tape together at 10' intervals.
   c. Expansion curls required at each wire connection – i.e. splice connection and electric valve. All splices made with made with Scotch Lok #3576 or equal.
   d. Field splices between automatic controller and electric valve, less than 500 ft apart, will not be allowed unless written approval provided.
3. **Spray Heads**
   a. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
   b. Acceptable manufacturer: Toro
   c. Acceptable product: "570": 4" for turf, 6" popup height for beds. COM heads are to be installed at lowest spot. No adjustable nozzles are to be used.
4. **Rotary Heads**
   a. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
   b. Acceptable manufacturer: Hunter
   c. Acceptable product: PGP Ultra
5. **Swing Joints**
   a. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.

b. Acceptable manufacturer: Hunter (for spray heads/rotors); KBI (for quick couplers)
c. Acceptable product: SJ-506/706 (for spray heads/rotors); KBI Sched. 80 (for quick couplers)

6. Install heads no closer than 4" from curbs and sidewalks and no closer than 6" from building walls.
7. **Remote Electric Valves**
   a. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
   b. Acceptable manufacturer: Weathermatic
   c. Acceptable product: "11000FCR" electronic remote control valve
8. **Quick Coupling Valves**
   a. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
   b. Acceptable manufacturer: Rainbird
   c. Acceptable product: 5 LRC (1" minimum)
   d. All Quick Couplers will be installed on swing joint and with isolation ball valve and at areas on main line that traverse under paving in sleeves.
9. **Quick Coupler Keys**
   a. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
   b. Acceptable manufacturer: Rainbird
   c. Acceptable product: 55K Single Lug - 1"
10. **Isolation / Cut Off Valves**
   a. Install at electric valves and all quick couplers. Isolation valves to be installed with each Quick Coupler and on irrigation mainline prior to being sleeved under hardscapes (i.e. concrete, asphalt, etc.).
   b. Size 3" or smaller shall be Utility Ball Valve, Spears PVC white, Slip to Slip. Size 4" or larger shall be Brass Gate Valve, Nibco.
   c. For more detailed specifications contact Ewing Irrigation at (210) 479-2888.
11. **Double Check Valve Assembly (DCVA)**: preferred brands FEBCO or WATTS for UTSA 1604 campus.
12. **Valve Boxes**
   a. Electric Control Valves: Only one valve box per electric control valve. Must be of size to adequately accommodate electric valve and isolation valve. Provide minimum of 4" deep clean pea gravel in bottom of all electric valve boxes, with a minimum of 2" clearance from top of electric valve. Lids shall be green in color.
      i. Standard valve box is 12"x18" for 2" or smaller electric valves, quick coupler valves & ball valves.

ii. Jumbo valve box is 13"x20" for 2-1/2" or greater electric valves and ball valves.

b. Wire Splices: Round - 10" minimum diameter. Lids shall be green in color.

13. **Controllers**
    a. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
    b. Acceptable manufacturer: Hunter
    c. Acceptable product: Hunter I-Core with smart port, outdoor controller, with wiring harness for remove capabilities and Hunter Remote Receiver (ICR-R)
    d. Provide direct-wired connection, not plug type connection.
    e. Locate controllers so that they are easily accessible from the areas they control. Do not locate inside of buildings.
14. **Rain/Freeze Sensors**
    a. This is a proprietary specification. UTSA will provide an executed "Justification for Specifying Proprietary Item in Construction/Procurement Specifications" form on a project-by-project basis.
    b. Hunter, Wireless Rain/Freeze Click Sensor
15. **Drip Irrigation**
    a. PVC headers and footers required on any drip tubing more than 30' in length.
    b. Drip tubing must be held down with sod staples or similar at max. 10' intervals.
    c. Only barbed fittings are allowed (no compression drip fittings).
    d. A flush valve is required at the lowest point of a drip zone.
    e. A 4" or 6" popup spray head with a flag or fully closed nozzle at the furthest point from the valve is required at each drip zone to indicate operating pressure.

C. **Execution**
1. Coordination with General Contractor to install Schedule 40 PVC sleeves prior to paving installation. Sleeves should extend a minimum of 6" from edges of sidewalk, curb, etc. Sleeves should be installed minimal of 18" between top of pipe and the bottom of aggregate base installed under concrete or asphalt.
2. Prior to irrigation installation, irrigation contractor should stake location of sprinklers and main line. Major discrepancies in drawings in regards to actual site conditions must be addressed through Irrigation Designer / Landscape Architect prior to beginning of irrigation install.
3. **Excavation**
    a. Piping is understood to be diagrammatic and piping shall be routed around trees and shrubs to avoid damaging plantings wherever possible. Where tree roots are encountered, no roots over ¾" in diameter shall be cut prior to notification of Landscape Architect.
4. **Pipe Installation**
    a. PVC Sleeving – size of sleeve a minimum of twice the diameter

of total pipe size designed to run through it. If required, can place two sleeves at same location to accommodate larger pipe sizes. Edge of sleeve to extend a minimum of 6" from the edge of sidewalk, street, curbing, etc. Sleeve locations to be marked with brass pins.

b. Main Line Piping - 18" depth of top of pipe from final grade with a minimum of 4" wide trench. Thrust blocks to be installed at turns on main line piping. Isolation valves to be installed at all areas on main line that traverse under paving in sleeves. Where possible, run main lines in turf areas, not planting areas.

c. Lateral Piping - 12" depth of top of pipe from final grade with a minimum of 4" wide trench

d. Connections: Turn pipe approximately 1/4 turn to distribute solvent and to remove air bubbles. Check all tees and elbows for correct position. Hold joint of approximately 15 seconds so that pipe does not push out from fitting. Use clean rag and wipe off all excess solvent.

e. No pipe shall be laid in when there is standing water in trench or at temperature at or below 32 degrees F

f. Line Clearance – all lines shall have a minimal clearance of 6" from each other. Parallel lines shall not be installed indirectly over one another.

g. Trenches: In all cases, fittings and couplings must be open to allow inspection prior to backfilling. Sufficient backfill material may be placed in trenches between fittings to insure stability of line when under pressure for testing. After approved, trenches are to be backfilled with washed sand with a minimum of 2" wash sand above highest pipe and below lowest pipe. The remaining trench is to be backfilled with specified landscape soil for project.

5. Install heads no closer than 4" from curbs and sidewalks and no closer than 10" from building walls. All heads must be connected by schedule 80 swing joints; no poly pipe or flex pipe accepted.

6. All Quick Couplers will be installed on swing joint and with isolation ball valve.

7. Double Check Valve – Isolation ball valves shall be installed on either side of Double Check Valve Assembly.

8. **Existing Irrigation Systems**

   a. Existing systems must be modified as part of the construction.

   b. Existing systems that are inside of the construction area should be shut off and disconnected and capped as appropriate during the construction period.

   c. Existing systems must be operational at the completion of the project.

9. **Thrust Blocks**

   a. Provide thrust blocks for 3" pipe or larger.

      i. To hold pipe in place

      ii. To minimize this horizontal movement of pipe

   b. Thrust block is constructed by pouring concrete between pipe/fitting and the undisturbed bearing wall of trench. It is

acceptable to insert rebar to hold concrete in place. A non-adhering material should be place between the pipe and concrete. A section of thin plywood is acceptable for this purpose.

i. Concrete is not intended or desired to incase piping.
ii. Concrete is not intended or desired to be poured on top or below pipe.
iii. Concrete is not intended or desired to be poured and cover any section of fitting to pipe connection.

c. Controller wires, if located where thrust block is to be installed, must be moved to opposite side of thrust block site to prevent encasement into concrete.

## 7. Landscaping

A. Acceptable trees, plants, and groundcover are those either native or adoptive to South Texas. Refer to "Master Plan".
1. Substitute for Texas Barberry since it does not seem to be doing well on the campus.
2. Substitute for Upright Rosemary since it does not seem to be doing well on the campus.

B. Acceptable grass for irrigated lawn areas: Bermuda grass 419 (Cynodon Dactylon) solid sod.

C. Acceptable grass for non-irrigated lawn areas: Buffalo grass 609 (Buchloe dactyloides) solid sod.

D. Soil used for bedding area applications: Landscape Mix from Fertile Garden, who can be contacted at (210) 688-9435
1. Typical pH ranges for the type of plant material used at UTSA should be between 5.5 to 7.0 with a minimal of 2% organic matter content.

E. Soil used for turf applications: Sandy Loam Top soil from Timm's Trucking, (210) 623-5936

1. Typical pH ranges for the type of plant material used at UTSA should be between 5.5 to 7.0 with a minimal of 2% organic matter content.

F. Mulch should be equivalent to Native Mulch provided through Gardenville / Fertile Garden - native hard wood.

G. **Other General Guidelines:**
1. Weed Control – Lawn and bedding areas should be free of weeds prior to acceptance. If this requires herbicide treatments by contractor, we required 72 hours notice of treatments and specifics on products used and rates of application.
2. Weed Cloth for bedding, shrub, and other mulched areas.
3. Mulch, where indicated, installed a 3" depth, with no mulch placed directly onto tree trunk base.
4. Prefer containerized material, unless B&B (for example - size or variety of tree) is necessitated.

5. **Soil / Area Preparations:**
   a. Any foreign material remaining from contractor's operations, to include stone, gravel, wood, etc. must be removed.
   b. Lawn / Turf areas: A minimal of 4" of soil amendments.
   c. Bedding / Shrub areas: A minimal of 8" of soil amendments.
   d. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, edging and any other operations required, until an acceptable lawn, free of eroded or bare areas, exist and are accepted.
   e. Re-establishment of staging areas and other areas disturbed by Contractor works. The warranty period for new and/or re-established landscaping shall be as per project specifications or, if not specified, no less than 90 days.
      i. Specifications addressing compaction issues.
      ii. Preparation of area to include soil amendments – no rock greater than 1" can remain on surface.
      iii. Buffalograss 609 - solid sod minimum for 5' from curb lines, roadways, etc.
      iv. Buffalo Grass seed: Variety: Tex-Oka - best for lawn type uses. Recommendation is 3 - 4 lbs per 1000 sq. feet for lawn type coverage. Seed Source Reference - Native American Seed, Junction, Texas, 800/728-4043
      v. Nurse Grass seed - Cereal Rye Grass. 25 lbs covers approx. 5000 square feet.
      vi. Buffalo grass (also Bermuda grass, and other Texas native grasses) is for long-term restoration; however, these grass types don't germinate until warmer weather / soil temperatures. Winter "nurse grasses", in this instance Cereal Rye is to keep soil / seed in place until time for buffalo grass to germinate, etc. Cereal Rye, as with other winter grasses, dies off with the spring / summer heat. Used alone – winter grasses will die off in summer with no vegetative coverage and summer grasses will wash away / be eaten by birds, etc. before they will germinate.
      vii. Establishment of vegetative coverage to include irrigation responsibility of contractor.
         - Standard run time for turf watering with rotaries is 30 to 45 minutes per day, three days per week here at 1604.
         - If heavy rainfall occurs and soils become saturated, irrigation should be suspended until soil dries out.
         - The Contractor is required to comply with all watering restrictions as established by San Antonio city ordinance and administered and enforced by San Antonio Water System (SAWS).
         - During drought periods where water restrictions are implemented, the Contractor is responsible for submitting a variance request to SAWS to

request additional watering days for the three-week time period immediately following installation of new turfgrass. The Contractor shall submit to UTSA a copy of the Letter Of Approval For Watering Variance received from SAWS prior to the start of watering.

viii. Removal of silt fencing to include removal of any rocks and filling in of trenching left from removal.

H. **Edging**

1. Provide concrete curb edging between turf and bedding areas.
   a. Top of concrete edge will be one inch above grass elevation.
   b. Reinforce curb with one #3 bar continuous.

I. **Design Considerations**

1. Minimize the use of annuals and concentrate color with perennials.

## 8. Site Furnishings

A. **General**

1. Outdoor furniture shall be suitable for industrial use, constructed from powder-coated aluminum, cast iron, concrete, vinyl-coated steel or fiberglass.
   a. New wood furniture is not allowed.
      i. Current wood furniture on campus is: Round Kingsley Bates Essex tables and Nantucket square back chair with arms, both of teak with a clear finish.
   b. Plastic and resin materials are not permitted.
2. Furniture shall be selected that compliments and enhances the prevailing campus architecture, highly visible but is still integrated into the physical setting, and takes into account comfort, use, safety and security.
3. Furniture shall be located on paved or other easily maintained surface.
4. Furniture shall be securely anchored or of sufficient weight to deter theft.
5. Existing wood furniture shall be allowed to weather with age and will not be replaced at the end of its life-cycle.

B. **Benches**

1. Locate new benches along walkways, within gathering spaces, near drop-off areas, adjacent to sports and recreation fields and near entrances, with placement on paved, non-vegetative surface.

C. **Tables and Seating**

1. Locate tables primarily adjacent to buildings or areas where eating and studying opportunities will exist.
   a. 5 – 10% of total tables provided shall accommodate wheelchairs.

D. **Trash Receptacles**

1. Locate trash receptacles adjacent to seating areas, eating areas, building entrances, gathering spaces, recreation and sports areas, and along

major pedestrian pathways, with placement at a minimum of 5 feet away from seating or eating areas.

2. Description: Decorative trash container frame is constructed using heavy-duty steel flat bar with painted finish and 32-gallon capacity commercial grade plastic liner. No moving parts and no ash urn.
3. Installation: The trash container should be pre-assembled, and have holes (0.5") provided in each foot for securing to concrete paving or footing, after confirmation of location by UTSA.
4. Guarantee: Five-year guarantee on all components, finishes and workmanship.

E. **Ash Urns**

1. Locate urns at building entrances in designated exterior smoking areas.
2. Ash Urns – must be designed to be permanently fixed in place.

F. **Bicycle Racks**

1. Description: Decorative bike rack shall be constructed from schedule 40 steel pipe and steel shapes with fully welded connections, and hot-dip galvanized finish.
2. Location: locate bicycle racks near to primary entrances to major buildings where bicycle traffic might be anticipated. Locate in such a way that future bike racks can be added easily.
3. Installation: Anchor to concrete walk using tamper-resistant concrete expansion anchors.
4. Quantity: provide space for 12 bicycles at each major building.

G. **Trash & Recycling Dumpster Enclosures**

1. **General**
   a. All Trash and Recycling Dumpsters are required to be screened from the right-of-way and all adjacent properties by an enclosure. A pair of equal width gates or doors is required when the opening is in view of the public right-of-way, except for 300-gallon side-loading automated containers.
   b. Quantity: (1) dumpster is required for every 40,000 square feet of building space for buildings in excess of 80,000 Square Feet of occupied space. The footprint of UTSA's standard dumpster is 40" wide by 78" long.
      i. For buildings less than 80,000 square feet of occupied space, two (2) dumpsters in one enclosure is required in order to have one (1) dumpster for trash and one (1) dumpster for recycling.
   c. Do not locate dumpsters in building loading docks.
   d. Do not install any utility piping, equipment, manholes, access hatches or grease pits/traps inside dumpster enclosures.
2. **Size**
   a. Enclosure height shall be a minimum of six (6) feet above finished grade and a maximum of eight (8) feet above finished grade.
   b. The gate or door shall not protrude into the required inside minimum dimensions.
   c. The interior clearance (inside the enclosure) dimensions for a:

i. Single 300-gallon container (side loading) enclosures shall be ten (10) feet deep x twelve (12) feet wide, with a mini- mum width of the service opening no less than 12 feet;
ii. Single (one four-yard or one eight yard) dumpster enclosures shall be 12 feet deep x 12 feet wide, with a mini- mum width of the service opening no less than 12 feet;
iii. Double (two four-yard or two eight-yard) dumpster enclosures shall be 12 feet deep x 24 feet wide, with a mini- mum width of the service opening no less than 24 feet;
iv. Triple (three eight-yard) dumpster enclosures shall be 12 feet deep x 36 feet wide, with a minimum width of the service opening no less than 36 feet; and
v. A 30-yard roll-off compactor enclosure shall be 29 feet deep x 16 feet wide, with a minimum width of the service opening no less than 16 feet.

3. **Finishes**
   a. The enclosure exterior & interior walls shall match the exterior architectural finishes of the adjacent building(s) which it is designed to serve.
   b. The floor of the enclosure shall be concrete and sloped appropriately to drain.
4. **Enclosure Protection**
   a. Galvanized, unpainted steel reinforcement shall be placed at the points where the dumpsters may make contact with the enclosure walls and entrance.
   b. Bollards are acceptable as a method of enclosure protection.
5. **Access**
   a. The dumpster enclosure shall be located adjacent to the service drive and/or loading dock of the building.
   b. The service drive adjacent to the enclosure shall not to exceed 6% slope, be minimum 22 feet wide and capable of supporting vehicles of 64,000 pounds GVW.
   c. The dumpster pad shall abut the access drive with a minimum of 42 feet clear space in front of the container pad.
6. **Drainage**
   a. The floor of enclosure shall slope ¼" per foot.
   b. Weeps are required at the perimeter of the enclosure wall.
7. **Pavement Standards**
   a. All dumpster service routes on site shall be constructed with the following minimum standards:
      i. Asphalt – a minimum of one and one-half inches (1.5") of asphalt pavement on top of six inches (6") of limestone base.
      ii. Concrete – all required container and dumpster pads shall be constructed of concrete six inches (6") thick. The reinforcement within the concrete section shall consist of number four (#4) bars on eighteen inch (18") centers, centered within the pavement thickness. All

concrete pads shall extend at least 25' in front of the service opening of the enclosure.

8. **Lighting** – provide lighting sufficient for the security and safety of personnel working at night and during the early morning hours.
   a. Provide metal halide flush wall mounted light fixtures with protective steel guards inside the enclosure to provide general illumination to the entire enclosure area. The light fixture shall have a photosensor.
9. **Area Trash Compactors**
   a. Compactors are a possible means to reduce the number of dumpsters required on campus.
   b. If a compactor is to be installed, vehicular access needs to be directly to the compactor.
   c. Compactors must be set on concrete, not asphalt as it will fail due to the weight of the container. Steel runners will be considered by UTSA.
   d. Compactors must be placed away from student housing and other areas of high occupancy and student/faculty activity.
   e. A drainage system shall be provided to reduce odors and pest infestation.
   f. Provide a hose bib for ease in wash-out.

*Division 33*

# Utilities

## 1. Utility Materials

A. **Manhole Covers**: Permanent inscriptions or text molded into cover shall be provided to identify the manhole as storm sewer, sanitary sewer, electrical, telecom, gas, etc.

B. Permanent inscriptions for manholes shall follow this schedule:
   1. Communications: "C – manhole number"; for example: "C-109"
   2. Electrical: "E – manhole number"; for example: "E-109"
   3. Storm Sewer: "ST – manhole number"; for example: "ST-109"
   4. Sanitary Sewer: "SS – manhole number"; for example: "SS-109"

C. Manhole access openings shall be at least 30" in diameter.

D. Provide fiberglass covers for electrical manholes or other frequently accessed locations. Coordinate with UTSA Facilities.

## 2. Water Distribution

A. Work of this section shall be performed by a firm engaged in the business of plumbing, and under the supervision of a master plumber, as defined by the State of Texas Plumbing License Law.

B. Water distribution piping material selection shall be at the discretion of UTSA.

C. Water distribution piping may be ductile iron or PVC. HDPE is prohibited for water distribution.

## 3. Natural Gas System

A. Work of this section shall be performed by a firm engaged in the business of plumbing, and under the supervision of a master plumber, as defined by the State of Texas Plumbing License Law.

B. Underground gas lines shall be black steel with yellow dielectric tape. Coordinate with UTSA for project specific preference.

C. All natural gas piping systems shall be designed and constructed in accordance with the Minimum Safety Standards for Natural Gas, 49 Code of Federal Regulations (CFR) Part 192.

D. All buried metallic pipe used for natural gas distribution must be properly coated and have a cathodic protection system designed to protect the pipe in its entirety. A Jeep Meter Test shall be performed on metal surface piping prior to pipe burial.

E. Contractor shall submit shop drawings describing the extent of the cathodic protection system. Shop drawings shall be prepared by an experienced corrosion engineer acceptable to UTSA.

F. Contractor shall test effectiveness of cathodic protection for all pipe sections for 1 year following substantial completion of system, and shall submit record of monitoring in accordance with 49 CFR Part 192 Appendix B, Form 14.

G. All new gas lines must be JEEP tested.

H. Hot Taps on natural gas piping systems should only be done when the isolation of natural gas in the line will significantly impact critical UTSA equipment or other mitigating factors as determined by senior UTSA Facilities Management.

1. Recommended safe hot tapping practices as outlined in API 2201 should be followed.
2. Full encirclement tee shall be used on all size-on-size gas line hot taps.
3. Gas line hot tapping procedures are to be presented to UTSA in a formal submittal and approved prior to commencement of work.
    a. Hot tap procedure changes must be formally submitted by RFI and approved by UTSA prior to commencement of work.

## 4. Fire Protection Water Distribution

A. Work of this section shall be performed by a firm engaged in the business of plumbing, and under the supervision of a master plumber, as defined by the State of Texas Plumbing License Law.

B. **Fire Hydrants**

1. Fire hydrants must be located within 500 feet maximum of any surface of the building at grade level.
    a. This is measured as a hose would be laid off of the back of a moving truck.
    b. Not over 150 feet of the distance can be pulled by hand.
    c. Curbing immediately adjacent to the fire hydrant shall be painted red and designated a "No Parking" zone, either by signage or striping, or combination of both.

C. **Fire Department Connections**

1. Fire department connections must be located within 40 feet of a paved roadway surface.
2. Locate one fire hydrant within 250 feet of the fire department connections.
3. Electrical connection of fire pumps upstream of emergency generators shall be considered by UTSA Facilities as a VE item on a project specific basis.

## 5. Sanitary Sewer & Storm Drainage

A. Work of this section shall be performed by a firm engaged in the business of plumbing, and under the supervision of a master plumber, as defined by the State of Texas Plumbing License Law.

B. Sanitary Sewer & Storm Pipe Joints (Joints for Hub-less Pipe and Fittings): Joints shall conform to the requirements of FM 1680 and shall be heavy-duty type 304 stainless steel shielded couplings. Smooth shielded couplings shall have a smooth shield with a minimum thickness of 25 gauge and corrugated shield with a thickness of 28 gauge. Approved manufacturers include Clamp-all 125 or Husky 4000.

C. Provide cleanouts at locations and maximum spacing per the latest adopted International Plumbing Code. In addition, cleanouts shall be provided for all service laterals and shall be located at all buildings and bends.

D. Storm drain piping shall be designed to maintain a flow rate of at least 2.5 feet per second to inhibit sediment accumulation.

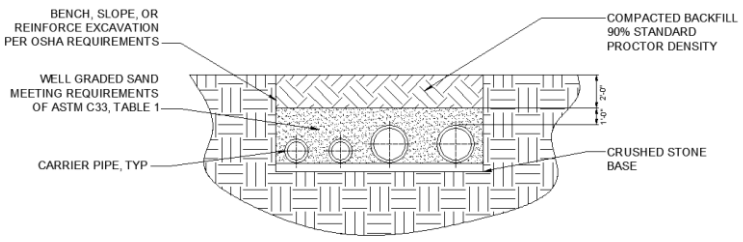
E. Storm sewer manholes or junction boxes with access openings shall be installed at all piping intersections, changes in slope and angle points. Small drain leads may use Y fittings instead.

F. Manhole Testing is required to conform to the rules of San Antonio Water Systems (SAWS) and TCEQ, whichever is most stringent at the time of testing. Required per manhole is a hydrostatic test (max. leakage at 0.025 gallons) and a vacuum test (2 minutes with min. 9 inches of mercury).

## 6. Site Utilities General Practices

A. **Piping**

1. For piping in tunnels, refer to Division 23 Standards.
2. Limit water flow to maximum 9 feet per second or 4 feet of head per 100 feet of pipe. Higher velocities on large bore pipe may be considered on variable flow applications with University approval.
3. All buried chilled water and heating hot water piping shall be pre-insulated, single-walled, carbon steel, standard schedule. Leak detection is not required.
4. Specify manufacturer's field joint closure kits for pipe joints and fittings.
5. Buried utility piping must be at least 36" from the top of pipe to grade, but no deeper than required.
   a. Typical direct buried pipe trench section detail:




6. A civil plan and profile is required.
7. Expansion loops should be utilized to account for thermal expansion in heating hot water systems. "Bolster Pads" should be utilized at elbow fittings. Expansion joints are not allowed.
8. Distribution piping plans should be coordinated with UTSA landscape group for review.

9. All exterior building wall pipe penetrations shall be installed with sleeves to prevent breakage from soil movement.
10. Location of all underground piping shall be marked by burying one magnetic warning tape for each pipe below grade in the backfill. The warning tape shall be placed 36" below grade above the top of each pipe and shall be parallel along the full length of the run.
11. Prior to backfill, installing contractor to document and provide surveyed coordinates of the following: 1 point along straight runs for every 50 feet of pipe, piping elbows, buried valves, mechanical manhole corners, buried anchor block corners, and similar points along electrical duct bank.
12. Thermal piping is preferred to be all at one horizontal level, not stacked vertically.
    a. Arrange piping in pairs by system with supply piping to the east, north, or on top as per direction of run or if stacking is required.
    b. Heating hot water to be to the east, north, or on top of chilled water when in same trench.

B. **Buried Pipe Restraints**
1. The use of thrust blocks is not permitted for buried piping.
2. Underground PVC joints may be restrained using the following options at the discretion of UTSA.
    a. Megalug, series as required, as manufactured by EBAA Iron, Inc. for PVC.
    b. JCM Industries, Inc. Sur-Grip restrainers, series as required for PVC or approved equal.
    c. CertainTeed Certa-Lok for PVC pipe.

C. **Valves**
1. Selection of direct buried valves or valves in pre-cast box shall be at the discretion of UTSA.
2. Direct buried valves shall be Pratt-Groundhog or similar valve suitable for direct buried service, epoxy coated body (100 mils thick), and "valve box" which allows actuator to be stroked open/close from surface. Valve box locations shall be communicated to Owner (e.g. valve's shall not be located on major campus roadways and only sidewalks, etc.)
3. Provide buried valves with Envirotrol ceramic spray-on insulation system, or approved equal.
4. Valve boxes shall not be located at sidewalks or road intersections and require an H-20 traffic rated lid. Valve box lids shall have identification text describing the piping system and valve location (i.e. CHW-23, STM-12).
5. All underground utility valves shall be standard resilient seated butterfly valves.
6. Provide isolation valves at all branch piping connections to distribution mains.

D. **High Point Manual Vents**
1. A high point vent and vent box shall be installed at least every 500 feet

and at intermediate high points in the hydronic piping.

2. High point vents shall constructed using a 1" weld-o-let, 1" vertical piping, and 1" full port ball valve.
3. Vents from chilled water and heating hot water supply/return piping should be grouped and routed to one vent box.
4. Vent boxes shall not be located at road intersections or sidewalks. Vent box lids shall have identification text describing the piping system and location (i.e. VENT-23).

E. **Backfill and Bedding Material**

1. Underground distribution trenches shall include a crushed stone base. Provide compacted sand meeting requirements of ASTM C33, Table 1 as backfill up to 12" above piping. The remaining backfill shall be 95% standard proctor density compacted soil up to 24" below grade with the top 24" being compacted to 90%.

F. **Concrete Vaults**

1. Concrete vaults (provided for double check valves and any other utility device) that are greater than 36 inches in depth shall be provided with a galvanized steel ladder permanently affixed to the vault. Ladder shall comply with OSHA requirements.

G. **High Voltage Ductbanks**

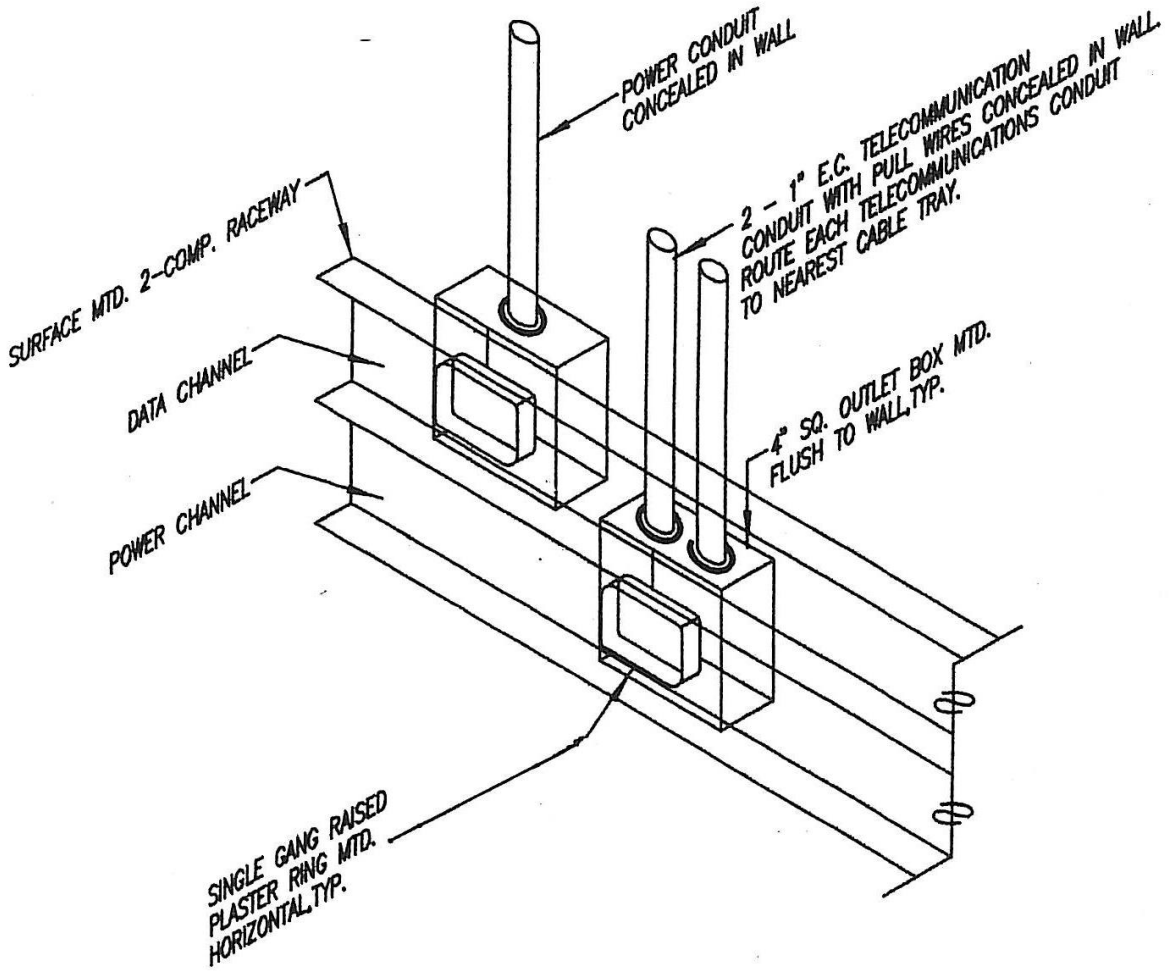
1. All high voltage ductbanks shall be fully encased in "red concrete". The red admixture shall be thoroughly mixed in the concrete slurry prior to pour. Broadcast surface application is not acceptable.

H. **Metering**

1. Each building shall be provided with an electrical meter to monitor electrical consumption and demand (kWh & kW).
2. Each building shall be provided with meters for natural gas and domestic water to monitor consumption (cubic feet & cubic feet per hour for natural gas; gallons & gallons per minute for water).
3. Each building shall be provided with flow and temperature measurement for BTU metering of chilled water and heating water (if supplied by this utility from a central loop) and steam flow meters to monitor energy consumption and demand. Chilled water meters shall monitor consumption in Tons-Hours and demand in Tons; hot water meters shall monitor consumption in BTU and demand in BTU per hour; steam meters shall display consumption in pounds and demand in pounds per hour. Meters shall be as specified by OFPC standard specifications.
4. Building meters shall be integrated with the campus control system to report and continuously record meter data for central gathering and trending purposes. Provide dedicated Ethernet connection to UTSA campus network if integration to building control system is not feasible. Coordinate with campus controls provider and/or IT department.
5. Verify adequate upstream/downstream straight pipe runs are available and include requirements within Design Documents for installing contractor to verify clearances prior to installation.

*Appendix A*

# Raceway Rough-In Detl.


POWER CONDUIT CONCEALED IN WALL
2 – 1" E.C. TELECOMMUNICATION CONDUIT WITH PULL WIRES CONCEALED IN WALL. ROUTE EACH TELECOMMUNICATIONS CONDUIT TO NEAREST CABLE TRAY.
SURFACE MTD. 2-COMP. RACEWAY
DATA CHANNEL
POWER CHANNEL
4" SQ. OUTLET BOX MTD. FLUSH TO WALL, TYP.
SINGLE GANG RAISED PLASTER RING MTD. HORIZONTAL, TYP.

Top of Appendix Table of Contents

*Appendix B*

# Building Signage

## 1. Scope of Standard

A. All doors openings and cased openings shall have a unique number.

B. All rooms and areas shall be identified with a number unique to the building the room in the area it's located.

C. This standard provides general guidance concerning the specific preferences of the University of Texas at San Antonio for Numbering Levels, Rooms, Stairways, and other areas for new building construction and existing building renovations.

D. UTSA recognizes that project conditions and requirements vary, thus precluding the absolute adherence to the items identified herein in all cases. It is expected that these guidelines will govern the design and specifications for numbering, unless variances are approved by UTSA FP&D.

E. This standard provides specific building signage layouts for interior and exterior building signs; parking garage signs; graphic symbols; and specifications for building identification plaque and sign.

## 2. General Numbering Standards

A. The intent of the guidelines presented here is to describe method of numbering levels, rooms, doors, corridors, stairways, and other areas in UTSA buildings that will provide sufficient information for the architect preparing a building's working drawings, and also provides easily identifiable spaces for the building's occupants and visitors to the building, to the buildings security, safety, and to UTSA's space inventory computer programs.

B. The basic procedures, which follow, may be modified as necessary to minimize complexity in the numbering system. It is presumed that this will allow occupants and visitors to locate rooms in a building more easily.

1. Numbering Levels:
    a. The different levels of the building are referred to as Sub Level, First Level, Second Level, etc., rather than Basement, Ground Floor, First Floor, etc.
    b. The levels are numbered, beginning in the Sub Level, from the lowest level of the building to the highest. The next Level up will be the Level One, Level 2, etc. and are the same levels as other existing buildings on campus.
    c. In a building where the level is at grade level and the level above is equal to the First level, the level at grade will be the Ground Level. In a building where there is more than one level

below grade, the first level below grade or below the Ground Level will be called Sub Level 1, the next below will be Sub Level 2, etc.

2. **Numbering Corridors:**
   a. Corridors are numbered using four of five digits, with the first and second digits separated by a decimal point. The first digit denotes the floor level; thus, all corridor numbers on Level 7 would begin with the number seven. The second digit would denote the various corridors. The third and fourth digits would be "00". Corridor numbers on Level 7 would be 7.100, 7.200, 7.300, etc.
   b. Where two or more corridors radiate away from a main entrance lobby, each may be given a separate corridor number. Corridors are numbered clockwise beginning immediately on the left as one enters the main entrance lobby on the main entry level and as one enters the main elevator lobby from the elevator, or leaves the main access stairway, on other levels. Major corridors that run perpendicular to (and intersect) corridors radiating from the entrance lobby may have separate numbers.
   c. Corridor segments that are completely isolated from the entrance lobby and from other corridors by large laboratories, shops, or office complexes may have separate corridor numbers that coincide with the number of the suite or room that they're in. When a building is separated into several segments by intervening patios or walkways, each segment can be assigned a separate corridor number or numbers, especially if they are occupied by different organizational units. This space shall have a room number assignment that is consistent to the corridor number that they are in (e.g., Corridor 1.400 with intervening rooms will be numbered 1.400.1, 1.400.2, etc).
   d. Corridor numbers do not change when a corridor makes a ninety-degree turn or crosses another corridor. On many floor levels there will be either one corridor which runs in a straight line from one end of the building to the other; one corridor that changes direction en route, but still runs basically from one end of the building to the other; or one corridor that makes (typically) a rectangular loop, ending at the same point at which it began (thus dividing an island of rooms in the center of the level from those around the level's perimeter). All of these corridor types would be numbered 7.100 if located, for example, on Level 7. Every short corridor segments running perpendicular to the main corridor should be numbered 7.100.1, 7.100.2, etc. The number of a corridor does not change if it passes through corridor doors; it is numbered as if the corridor doors were not there at all. This is done this way in the event that there open areas in the corridors that have special assignments (in this case they shall be numbered 2.100A, 2,100B, etc). Whenever possible use the same general pattern to number corridors on succeeding floors of the same building.

e. A partial floor level area above the highest complete level of the building may have a corridor number corresponding to the corridor area directly below it. For example, if the only floor area on Level 8 is directly above the 7.400 area, then that area may be numbered 8.400, even though there would be no 8.100, 8.200, or 8.300 areas.

3. **Numbering Rooms:**

a. A room is generally considered to be an area in a building enclosed by walls and entered from a corridor or from another room by means of a door or, occasionally, A cased opening or a door-sized open entryway. Each room number would have four digits (and possibly a one or two letter or number suffix). The first two digits denote the level and the corridor number, while the third and fourth denote the specific room (e.g., 7.102, 7.104, 7.126, etc.). The letter suffixes are described later.

b. Initially, even numbers are used when numbering rooms along a corridor. Odd numbers are thereby reserved for changes during the working drawing phase, change orders during construction, and future remodeling.

c. Rooms along a corridor are numbered beginning with the door nearest the main entrance lobby (for corridors radiating from a main entrance lobby); beginning with the door nearest the main access elevator or stair when that elevator or stair is at either end of the only corridor on a particular level; beginning with the first door at the end of the corridor (generally starting at the left end) as one enters the level from an elevator or main access stairway located near the center of a single, straight corridor; or beginning immediately to the left of the main elevator or stairway on a corridor that makes a complete rectangular loop around a floor level.

d. Since many rooms have more than one door that opens onto a particular corridor (or doors that open onto separate corridors) it must be determined which door is the primary or main access door of the room. It is the location of the main access door that is the key to numbering such rooms. Beginning at the end of a corridor, the first room whose main access door opens onto the corridor will have the lowest even room number on that corridor (e.g., 7.102). The next main access door passed on either side as one moves down the corridor will have the next highest even number (7.104), and so on. If doors on opposite sides of the corridor are located at identical intervals, one should alternate sides of the corridor when numbering these rooms. The last main access door passed at the far end of the corridor will have the highest room number on that corridor.

e. If a room has doors on two different corridors, number it as being on the corridor that has the room's main access door, for example if the main access into a suite is 1.204 then the primary door is numbered 1.204. When there are more than one access to the suite from another corridor then the second door starting from the left will be numbered 1.204-1, 1.204-2 etc.

This tells everyone entering that its part of the same suite or area as in the main access located in another corridor.

f. Interior rooms inside a primary room, which has its main access door on a corridor, are numbered with the primary room's number and a letter suffix. Thus, rooms inside 7.102 (those whose main access is through 7.102) would be numbered 7.102A, 7.102B, etc., beginning on the left as one enters 7.102 and proceeding clockwise. In a suite with more than twenty-four interior rooms (avoid using "I" and "0," which might appear to be numerals) use "AA," "AB," etc., after "Z" has been used. Rooms inside 7.102, in the same manner, would be 7.102AA, 7.102AB, etc. Due to limitations on the number of room number characters that the space inventory computer programs will accept, rooms inside of 7.102AA, for instance, would have to be numbered 7.102AA.1, 7.102AA.2, etc.

g. A mezzanine or partial floor levels that fall between other full floor levels would be numbered M1.200. This says that this level is between Level 1 and Level 2 and is directly above corridor 1.200. M4.100, falls between Level 4 and Level 5 and is directly above corridor 4.100, etc.

h. A mezzanine room within a larger room i.e. 1.228B the mezzanine will be numbered 1.228B.1.

i. Very large open areas or departmental suites within a building, entrance/reception lobbies, large open shop or laboratory areas, or open card catalog/circulation desk areas in a library, shall be numbered in the same manner as room (i.e., 1.102, 1.104, or 1.106, etc.), especially if they contain a large numbers and interior rooms. The rooms entered from these very large open areas shall be, i.e. 1.102, and adjoining opening next to this room would be numbered in the sequence as it follow the corridor (e.g., 1.102B, 1.102D, etc.).

j. All rooms whose main access door (or only door) is entered from outside the building would use "0" for the corridor digit. For example, mechanical rooms on Level 1 might be 1.002, 1.004, 1.016, etc., if they are entered from the outside.

k. Where there are no available room numbers in a corridor sequence, odd or even (for example, in a sequence 3.196, 3.197, 3.198, 3.199), and an already existing room is being divided in half (3.197, for instance) with both rooms having main access doors on the corridor, then one room may be numbered 3.197A, even though it is not entered through 3.197.

l. Small entry vestibules, even if separated from the main room (a large auditorium, for instance) by a set of doors, are numbered as if they were physically part of the main room. Each door leading into this main room (i.e. 1.210 Lecture Hall) shall be numbered shall have the same room number and each door would have a separate number separated by (-1), (-2) etc. for example one set of doors shall be numbered 1.210-1 and another set would be numbered 1.210-2. The primary entry in to the area shall be numbered 1.210.

4. **Numbering Stairs & Elevators:**

a. Stairways are numbered in a three-character sequence (e.g., 2.S1). The first character reflects the level numbers. The second-character denotes "S" for Stair, followed by the third character is always indicates the stair sequence number.

b. Stair Number 1 is the main access stairway; other stairways may be numbered in sequence, beginning (generally) clockwise from Stair Number 1.

c. Elevators are numbered in the same manner as stairs, except that the letter "E" is used for the second character (e.g., 2.E1, 2.E2), rather than the letter "S" (2.E1 would indicate Elevator Number 1, on Level 2,)

5. **Graphics Plates – Interior, Exterior, Parking Garage & Graphic Symbols**

a. Room Numbering I.D. signs the room number ID Sign shall be located beside the door of a particular room generally shows the room's official room number (e.g., 1.302, 1.302A, 1.302A.1, etc.). The ID Sign for rest rooms, would have a room number assigned to it and also have the word "MEN" or 'WOMEN"; similarly, the plate for stair 3.S4 would say "STAIR 4", and the plate for elevator 2.E3 would say "ELEVATOR 3". (Other descriptive room information, such as LABORATORY, OFFICE, CONFERENCE ROOM, will not be included on a sign). All room IN Signs will have the room number.

b. Signs shall be designated by an identification system, based on whether the sign is interior (I), exterior (E), parking garage (P) or graphic symbol (S). The system created by the University is as follows –

i. **Interior Signs**

- ST-I-01 - Base Building Room Identification
- ST-I-02 - Public Room Identification
  - ST-I-02b – Conference Room Identification/Scheduler
- ST-I-03 - Stairwell Identification
- ST-I-04 - Stairwell Landing Lifesafety
- ST-I-05x - Restroom Identification
  - ST-I-05a - Men
  - ST-I-05b - Women
  - ST-I-05c - Unisex
- ST-I-06x - Regulatory Message
  - ST-I-06a - "Staff Only Beyond This Point"
  - ST-I-06b - "No Combustible Storage In This Room Per Order Of The Fire Marshal"
  - ST-I-06c - Occupancy Load Limits
  - ST-I-06d - "No Entry"
  - ST-I-06e - "No Exit"
- ST-I-07 - Elevator Egress Map
- ST-I-08 - Corridor Directional
- ST-I-09x - Special Area Identification
  - ST-I-09a - Major Lecture Hall/ Auditorium

- ST-I-09b - Restroom Alcove (3" x 12")
- ST-I-10 - Floor Level Directory
- ST-I-11a, I-11b - Building Lobby Directory

ii. **Exterior Signs**

- ST-E-01 - Building Identification (1'-0" x 2'-4")
- ST-E-02 - Smoking Prohibited
- ST-E-03 - Fire Lane Marker

iii. **Parking Garage**

- ST-P-01 - Entrance/Exit/Clearance Info.
- ST-P-02 - Overhead Directional (typical layout)
- ST-P-03 - Column Mounted Level Identification
- ST-P-04 - Wall Mounted Level Identification
- ST-P-05 - Floor Mounted Directional
- ST-P-06 - Mounting Pole Signage

vi. **Graphic Symbol**

- ST-S-01 - Do Not Enter
- ST-S-02 - Stop
- ST-S-03 - No Right Turn
- ST-S-04 - No Left Turn
- ST-S-05 - Interior Arrow
- ST-S-06 - Exterior Arrow
- ST-S-07 - No Smoking
- ST-S-08 - Accessibility

c. The appearance of University-approved building signage is included as at the end of this Standard, keyed by the sign designation system as per above.

d. New signage needed for interior renovations in campus buildings with old-style signage – 8"x8" to 10"x10" Gravograph frame systems – will be 8"x8" Gravograph system of color/finish to match existing adjacent signs. Braille shall be Raster-type in lieu of Type II. This style is also to be used in UTSA lease space projects.

e. The following table indicates which building in the tri-campus UTSA system follows which Sign Standard style: The Capital Projects style is as per the attached interior sign graphics; the 8" x 8" Framed style is the Gravograph system as described in d., above; and the remaining styles were established at individual building types:

| Building/Complex | Abbrev | Sign Standard Type | Color |
|---|---|---|---|
| **MAIN CAMPUS** | | | |
| Chaparral Village | CV | Student Housing Style | Match |
| Roadrunner Café | RRC | Capital Projects Style | Match |
| Central Receiving & Warehouse | CRW | 8" x 8" Framed Style | Match |
| Center for Archaeological Rsrch | CAR | 8" x 8" Framed Style | Match |
| Sculpture & Ceramics | SC | 8" x 8" Framed Style | Match |
| Science Research Labs (SAL) | SRL | 8" x 8" Framed Style | Match |
| Science Research Labs (LSL) | SRL | Capital Projects Style | Match |
| Science Research Labs (PSL) | SRL | Capital Projects Style | Match |
| Business Service Annex | BSA | 8" x 8" Framed Style | Match |
| Facilities Services Building | FSB | 8" x 8" Framed Style | Match |
| Margaret Batts Tobin Laboratory | MBT | Capital Projects Style | Match |

| | | | |
|---|---|---|---|
| Bosque Street Building | BOS | 8" x 8" Framed Style | Match |
| Thermal Energy Plant | TEP | 8" x 8" Framed Style | Match |
| Tobin Avenue Garage | TAG | 8" x 8" Framed Style | Match |
| Ximenes Avenue Garage | XAG | Capital Projects Style | Match |
| Bauerle Road Garage | BRG | Capital Projects Style | Match |
| McKinney Humanities | MH | 8" x 8" Framed Style | Match |
| Plaza Norte Building | PNB | Capital Projects Style | Match |
| North Paseo Building | NPB | Capital Projects Style | Match |
| University Center North | UC | 8" x 8" Framed Style | Match |
| HEB University Center | HUC | Capital Projects Style | Match |
| Recreation Wellness Center | RWC | Capital Projects Style | Match |
| Child Development Center | CDC | Capital Projects Style | Match |
| Business Building | BB | 8" x 8" Framed Style | Match |
| John Peace Library | JPL | 8" x 8" Framed Style | Match |
| Main Building | MB | Capital Projects Style | Match |
| Arts Building | ART | 8" x 8" Framed Style | Match |
| Engineering Building | EB | 8" x 8" Framed Style | Match |
| Biosciences Building | BSB | 8" x 8" Framed Style | Match |
| Peter T. Flawn Bldg. (Science) | FLN | 8" x 8" Framed Style | Match |
| Biotechnology Sciences & Eng. | BSE | Capital Projects Style | Match |
| Multidisciplinary Studies Bldg. | MS | 8" x 8" Framed Style | Match |
| Convocation Center | CC | 8" x 8" Framed Style | Match |
| Physical Education Building | PE | 8" x 8" Framed Style | Match |
| Laurel Village | LV | Student Housing Style | Match |
| Chisholm Hall | CH | Student Housing Style | Match |
| San Saba Hall | SSH | Capital Projects Style | Match |
| **DOWNTOWN CAMPUS** | | | |
| Frio Street Building | FS | Capital Projects Style | Match |
| Buena Vista Street Building | BVB | 8" x 8" Framed Style | Match |
| Durango Building | DBB | 8" x 8" Framed Style | Match |
| Downtown Parking Garage | DTG | unknown | Match |
| Monterey Building | MNT | 8" x 8" Framed Style | Match |
| **HEMISFAIR PARK CAMPUS** | | | |
| Institute of Texan Cultures | ITC | Custom, round corner | Match |
| **PARK WEST CAMPUS** | | | |
| Fan Amenities Building | FAB | Capital Projects Style | Match |
| Track & Soccer Stadium Bldg. | TSS | Capital Projects Style | Match |
| Site Maintenance Bldg. | SMB | Capital Projects Style | Match |
| **LEASE SPACE** | | | |
| University Heights Tech Center | UH | 8" x 8" Framed Style | Match |
| Lockhill-Selma Building | LSB | 8" x 8" Framed Style | Match |

C. **Graphics – Exterior & Interior Building Department Identification Sign Lettering**

1. Exterior & Interior Building Department Identification Signage for Colleges, Departments, Centers, Institutes and donor or honorific recognition
   a. Only Colleges, Departments, Centers and Institutes are allowed to install interior building lettering on the wall, to identify their location.
   b. Honorific or donor names should be last name only and should not include any title or designations.
   c. The sign standard is individual wall-mounted dimensional letters with the following layout characteristics:
      i. Signage shall be mounted on the right side of the door
      ii. Text shall be left justified
      iii. Text shall be on two lines: Top line shall state

"Department of", "Institute for", or "Center for" or donor/honorific name.

iv. Top of letters of upper text line shall be 6"-0" A.F.F

d. Material
   i. Exterior: Raised aluminum letters
   ii. Interior: Plastic with metallic laminate
e. Color: (Antique Brass) Mathews Paint MP42490 R122306 Nuance Satin V1.2 finish
f. Font: Myriad Pro Bold font, upper/lower case
g. Size
   i. Exterior: 5-inch high maximum capital lettering, and.75" thick
   ii. Interior: 3-inch high maximum capital lettering, and .375" thick
h. Deviations from any of the above must be approved by UTSA Office of Facilities except for honorific and donor names which must be approved by the Vice-President for External Relations.

D. **Graphics – Building Identification**
1. Building Identification Plaque
   a. Shall be of cast bronze material.
   b. Shall conform with specifications in "Owner's Design Guidelines" for the UT System, Division 1.
2. Building Identification Sign Lettering
   a. Shall be in conformance with guidelines set forth by Facilities Planning & Design.

E. Permanent signage installed without approval of UTSA Facilities and in violation of the Signage Standards delineated herein is subject to removal at Facilities' discretion.

## 3. Signage Approval Process

A. Prior to Design Development, the project architect shall submit to UTSA a floor plan with assigned room numbers in conformance with this Standard for approval.

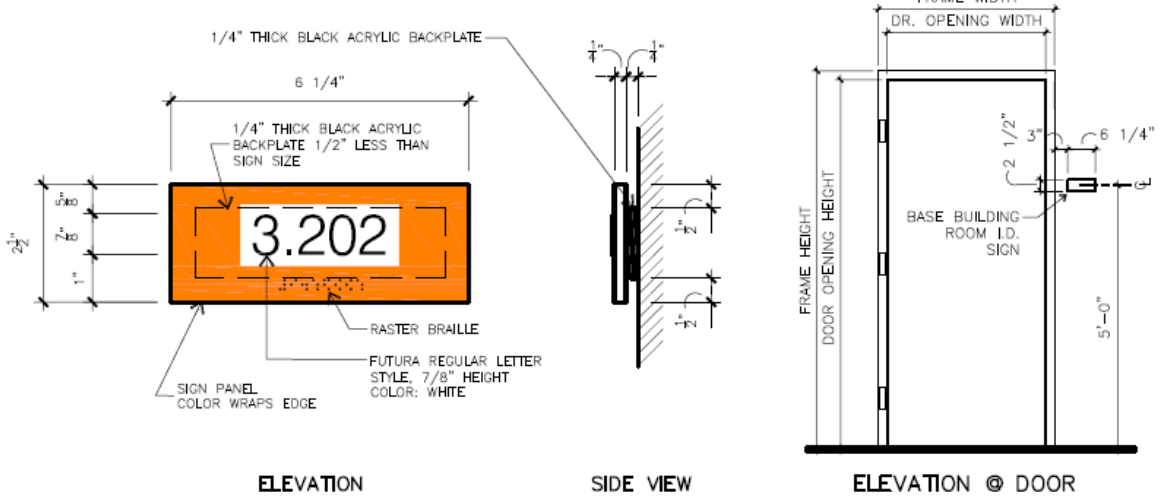
B. Project signage submittals shall be submitted to the UTSA Project Coordinator for review. The submittal shall be routed to the Capital Project Sr. Project Manager to coordinate appropriate internal reviews by the Office of Space Management and Facilities Planning & Design. Submittals shall consist of:
1. All Floor maps for the Building Lobby/Floor Level Directories and Elevator Egress Maps; consisting of two different styles of maps.
2. Door/signage schedule keyed to floor plans indicating numbering.
3. Paper drawings of signage mockups for all signs planned in the project in compliance with these Standards, including a layout for the Building Identification Plaque (based on UT System direction for names to appear on it).
4. Exterior building elevation paper drawing, sample of lettering, and full-size wood letter mockup on the building (to determine spacing, confirm size, etc.) for Building Identification Lettering.

5. Exterior door elevations showing Building Identification (i.e. vinyl lettering) layout.

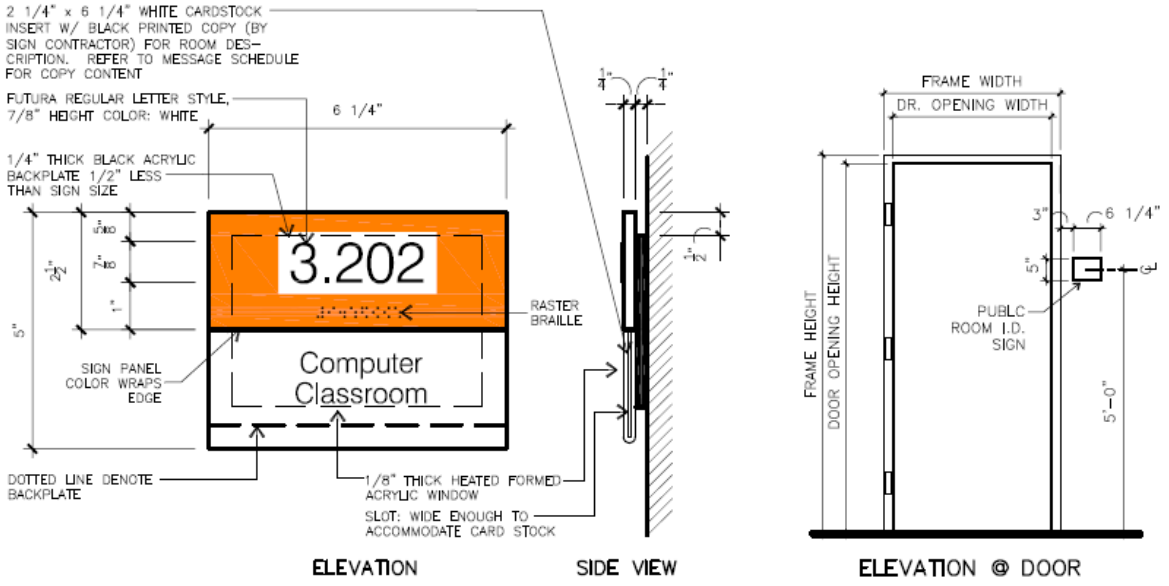
C. The Office of Space Management will review all directories and corridor directional signs for appropriate designation of departments. Facilities Planning & Design will review all exterior signage (including Building Identification Lettering and Building Identification vinyl letters) with respect to aesthetics, the 2009 Master Plan, and wayfinding. The Capital Project Sr. Project Manager will evaluate all remaining signage for compliance with these Standards.

D. Submittal comments shall be addressed and resubmitted to UTSA until there is a 100% concurrence with the signage submittal/mockups prior to manufacture.

E. Final signage installation shall be reviewed by UTSA to determine conformance with signage submittal.




BASE BUILDING ROOM IDENTIFICATION
ST–I–01
SCALE: NTS


2 1/4" x 6 1/4" WHITE CARDSTOCK INSERT W/ BLACK PRINTED COPY (BY SIGN CONTRACTOR) FOR ROOM DESCRIPTION. REFER TO MESSAGE SCHEDULE FOR COPY CONTENT
FUTURA REGULAR LETTER STYLE, 7/8" HEIGHT COLOR: WHITE
6 1/4"
1/4" THICK BLACK ACRYLIC BACKPLATE 1/2" LESS THAN SIGN SIZE
3.202
RASTER BRAILLE
Computer Classroom
SIGN PANEL COLOR WRAPS EDGE
DOTTED LINE DENOTE BACKPLATE
1/8" THICK HEATED FORMED ACRYLIC WINDOW
SLOT: WIDE ENOUGH TO ACCOMMODATE CARD STOCK
ELEVATION
SIDE VIEW
FRAME WIDTH
DR. OPENING WIDTH
FRAME HEIGHT
DOOR OPENING HEIGHT
3"
6 1/4"
5"
PUBLC ROOM I.D. SIGN
5'-0"
ELEVATION @ DOOR

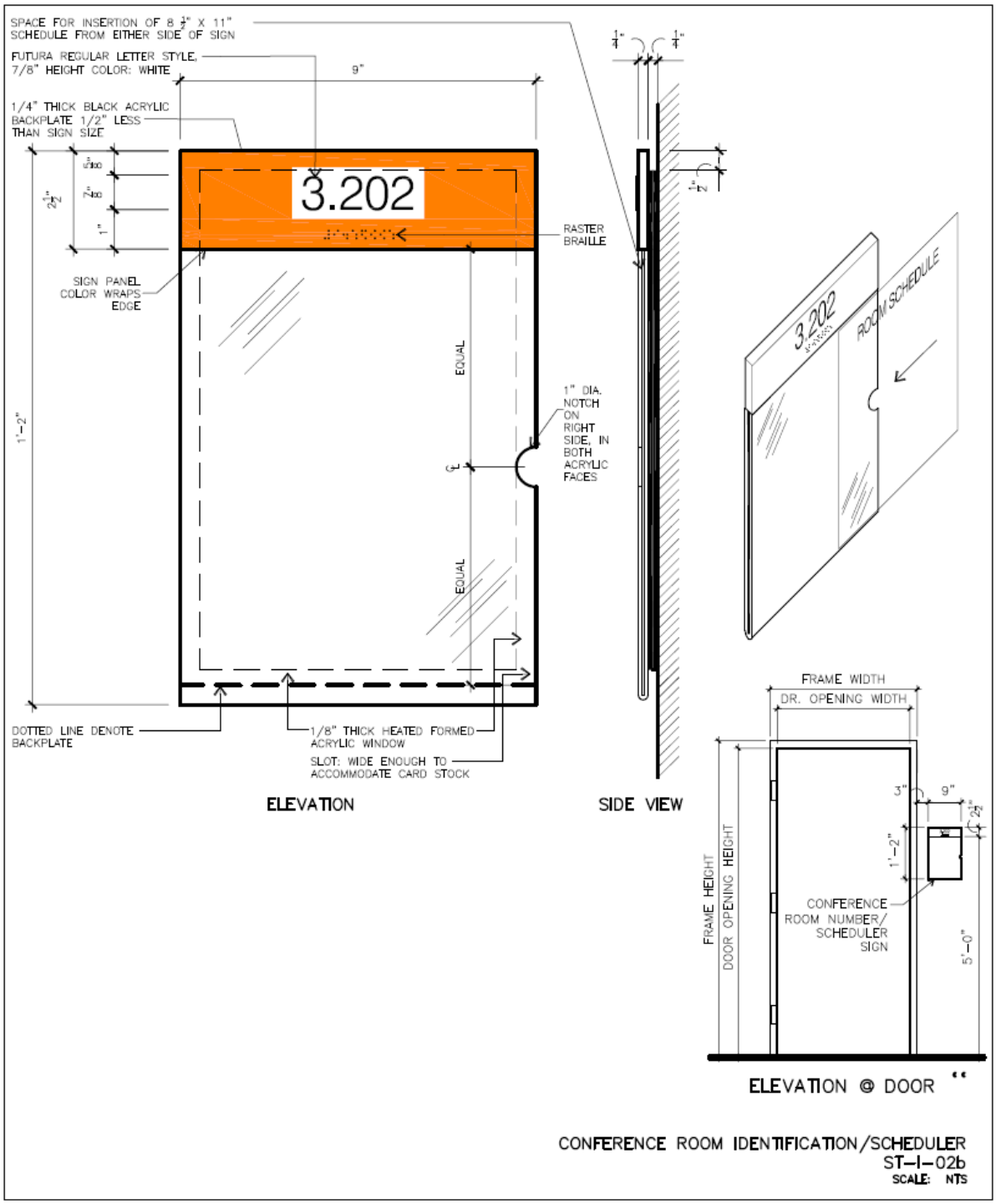
PUBLIC ROOM IDENTIFICATION
ST–I–02
SCALE: NTS

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / HC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-01 & ST-I-02

By: JJJ
Date: 10/24/07, 6/2/09 (rev)
File Name: ST-I-01.dwg

## ST-I-01, ST-I-02

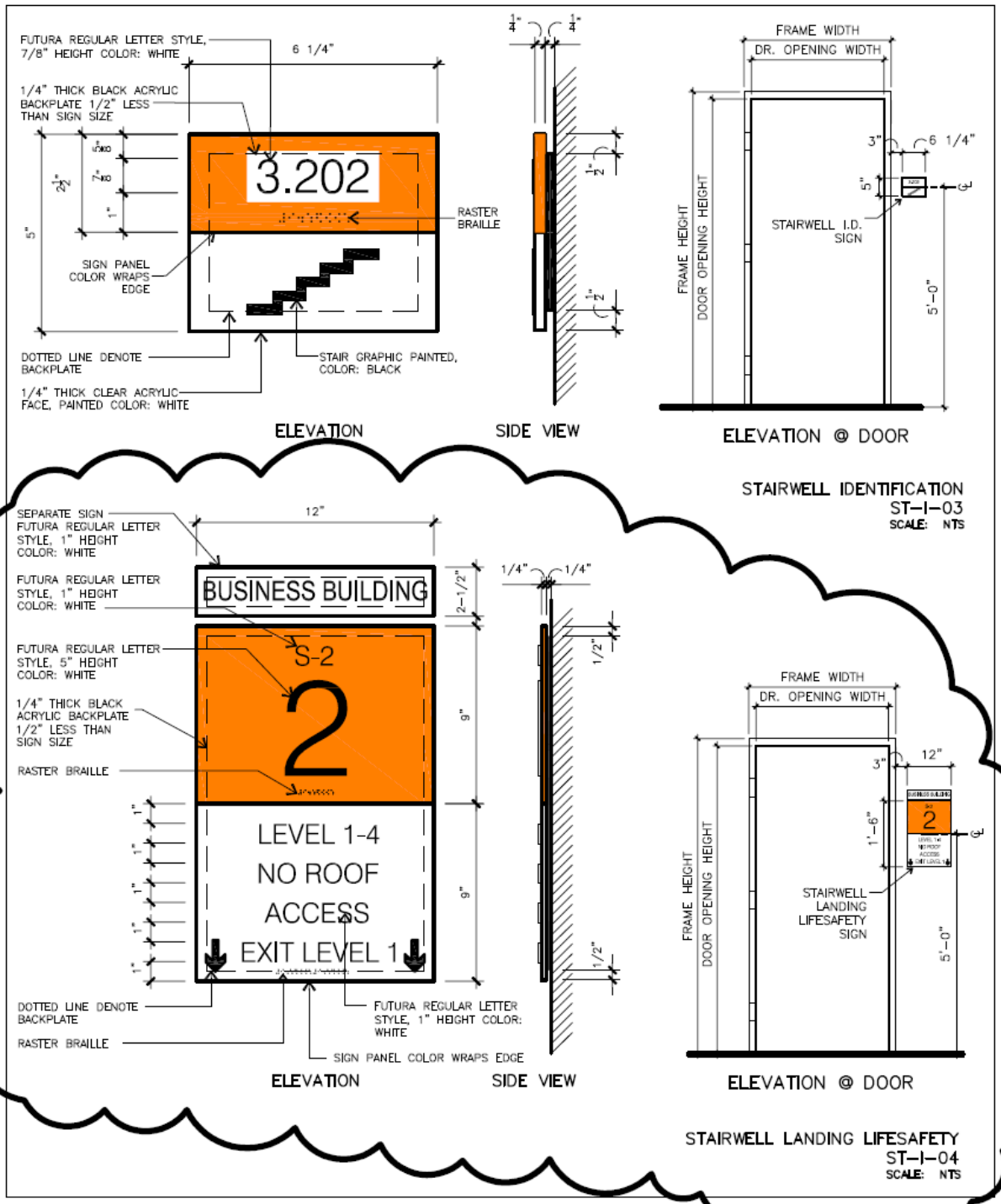



The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / HSC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-02b

By: JJJ
Date: 4/21/08, 6/2/09 (rev)
File Name: ST-I-02b.dwg

**ST-I-02b**



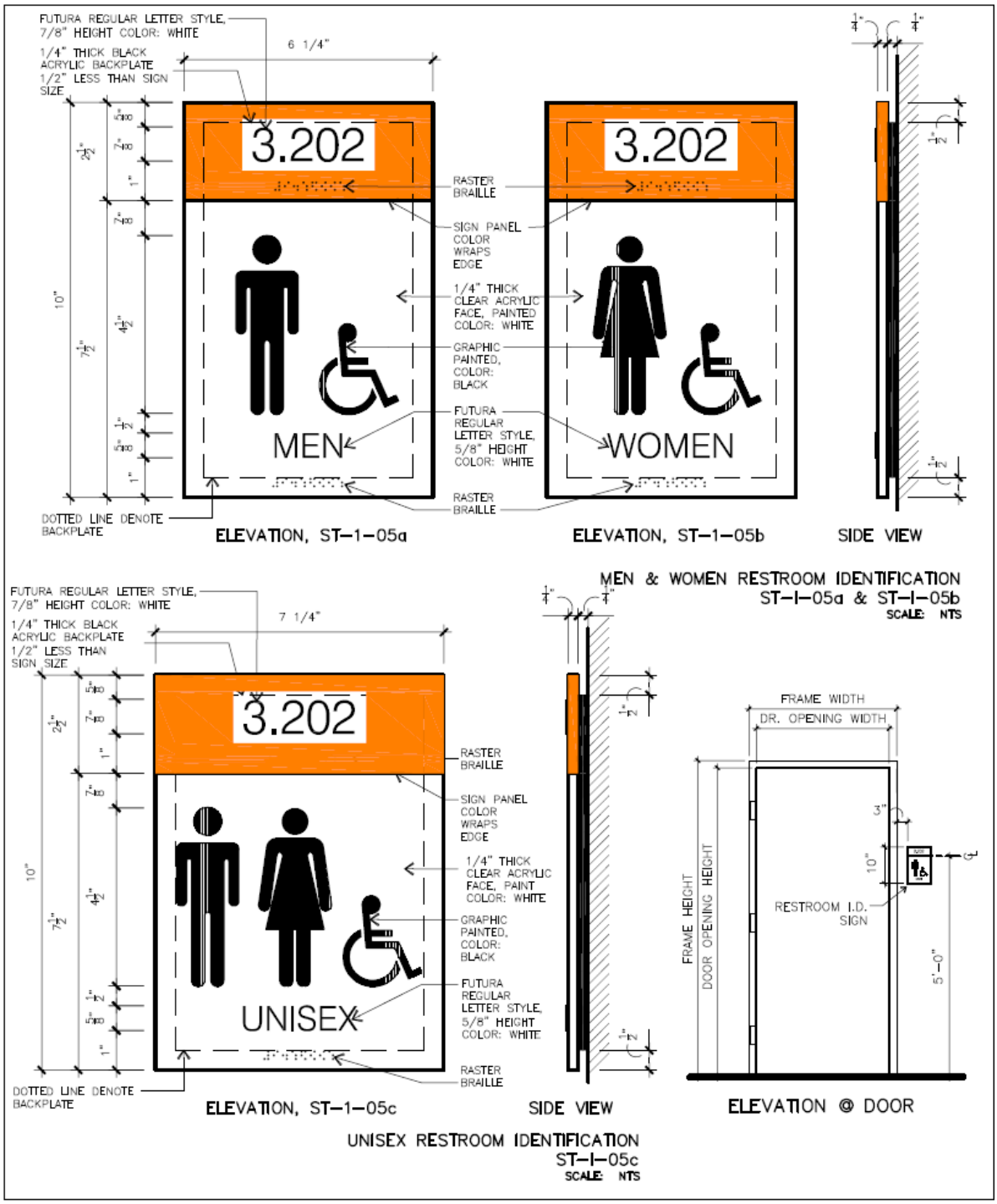

The University of Texas ☆ San Antonio

1604 Campus / Downtown Campus / HC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-03 & ST-I-04

By: JJJ
Date: 11/14/07, 6/2/09, 4/27/12 (rev)
File Name: ST-I-03.dwg

## ST-I-03, ST-I-04



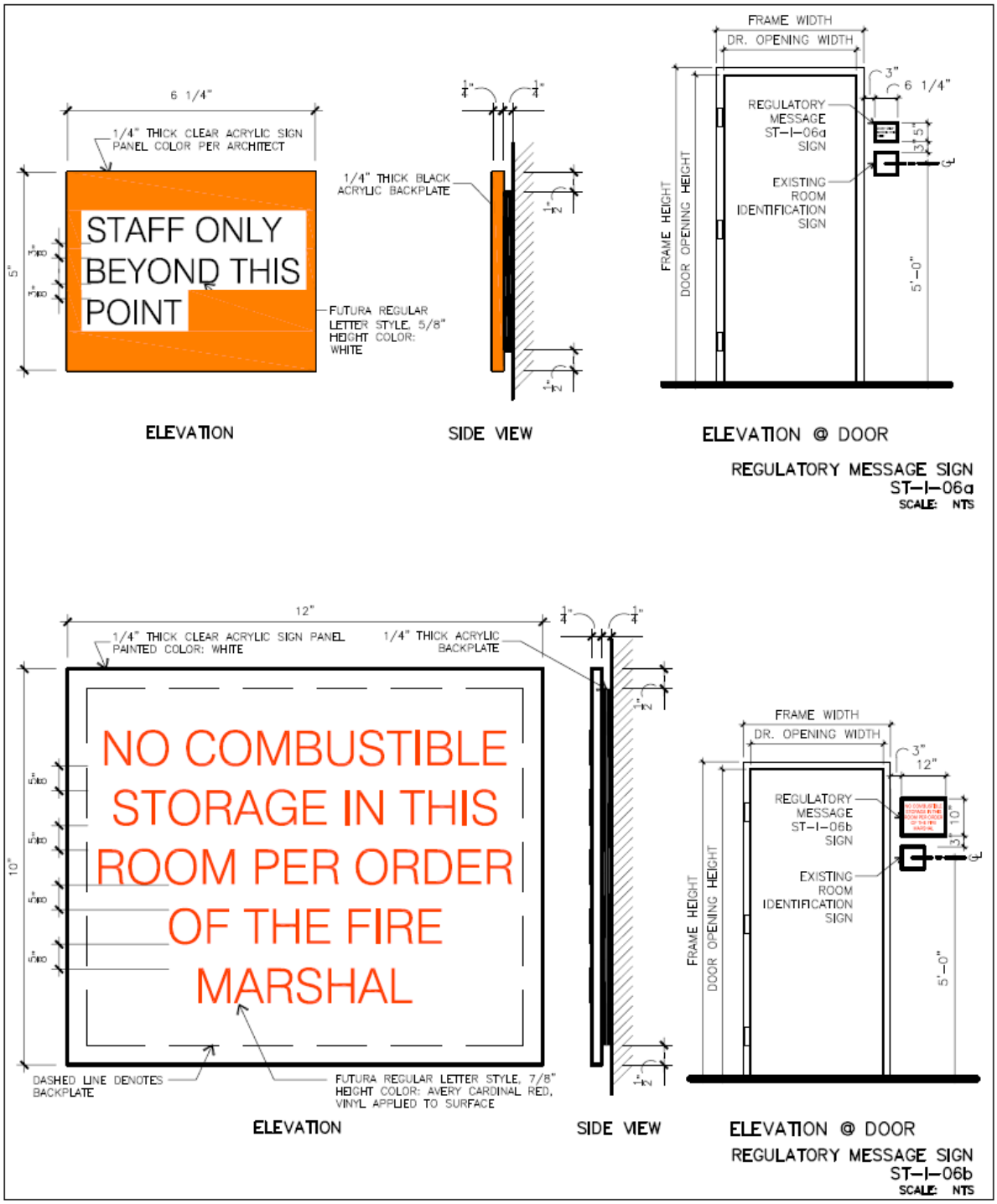

The University of Texas ☆ San Antonio

1604 Campus / Downtown Campus / HSC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-05

By: JJJ
Date: 11/14/07, 6/2/09 (rev)
File Name: ST-I-05.dwg

## ST-I-05a, ST-I-05b, ST-I-05c

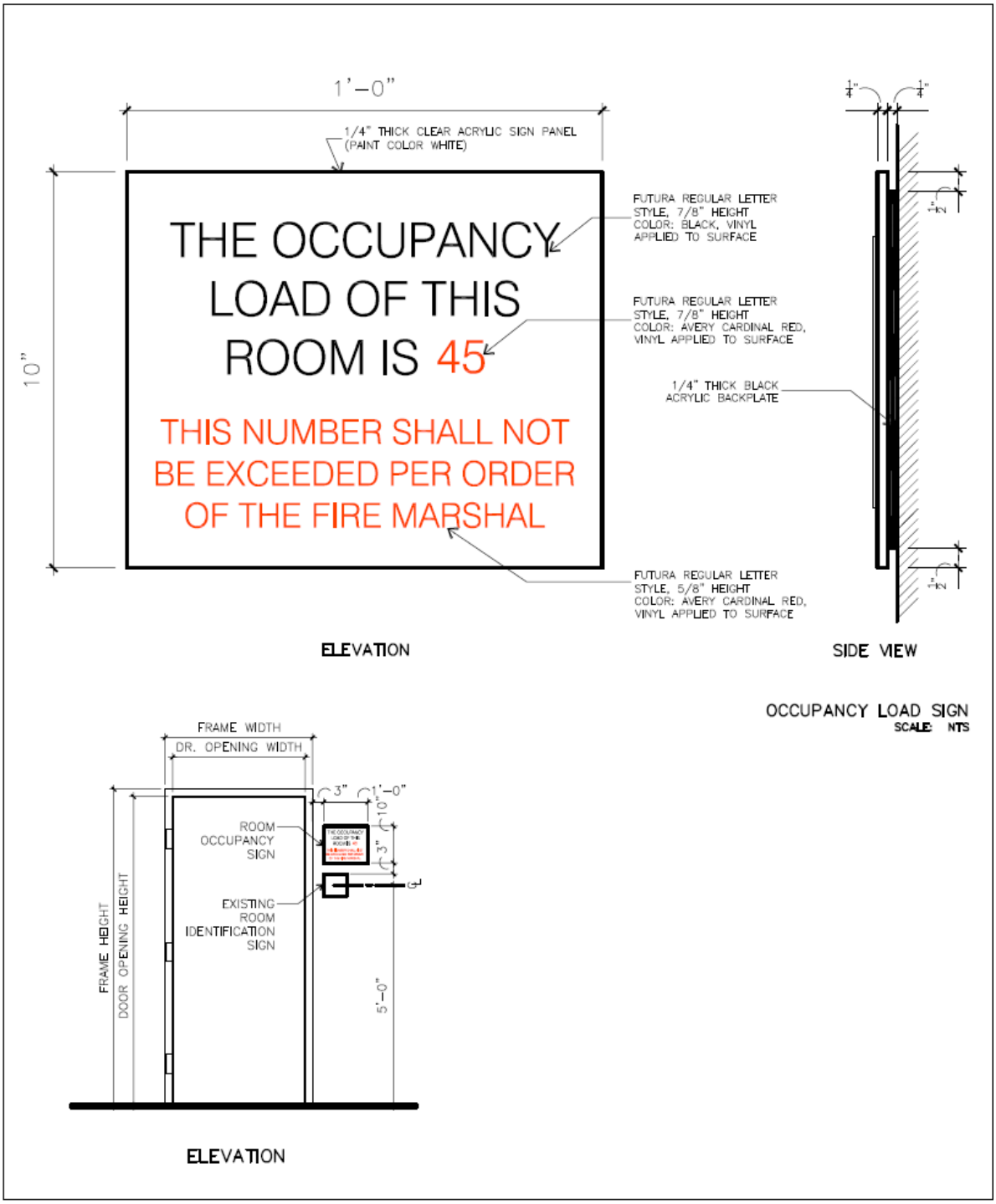



The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / HC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-06a & ST-I-06b

By: JJJ
Date: 11/19/07, 6/2/09 (rev)
File Name: ST-I-06a.dwg

## ST-I-06a, ST-I-06b

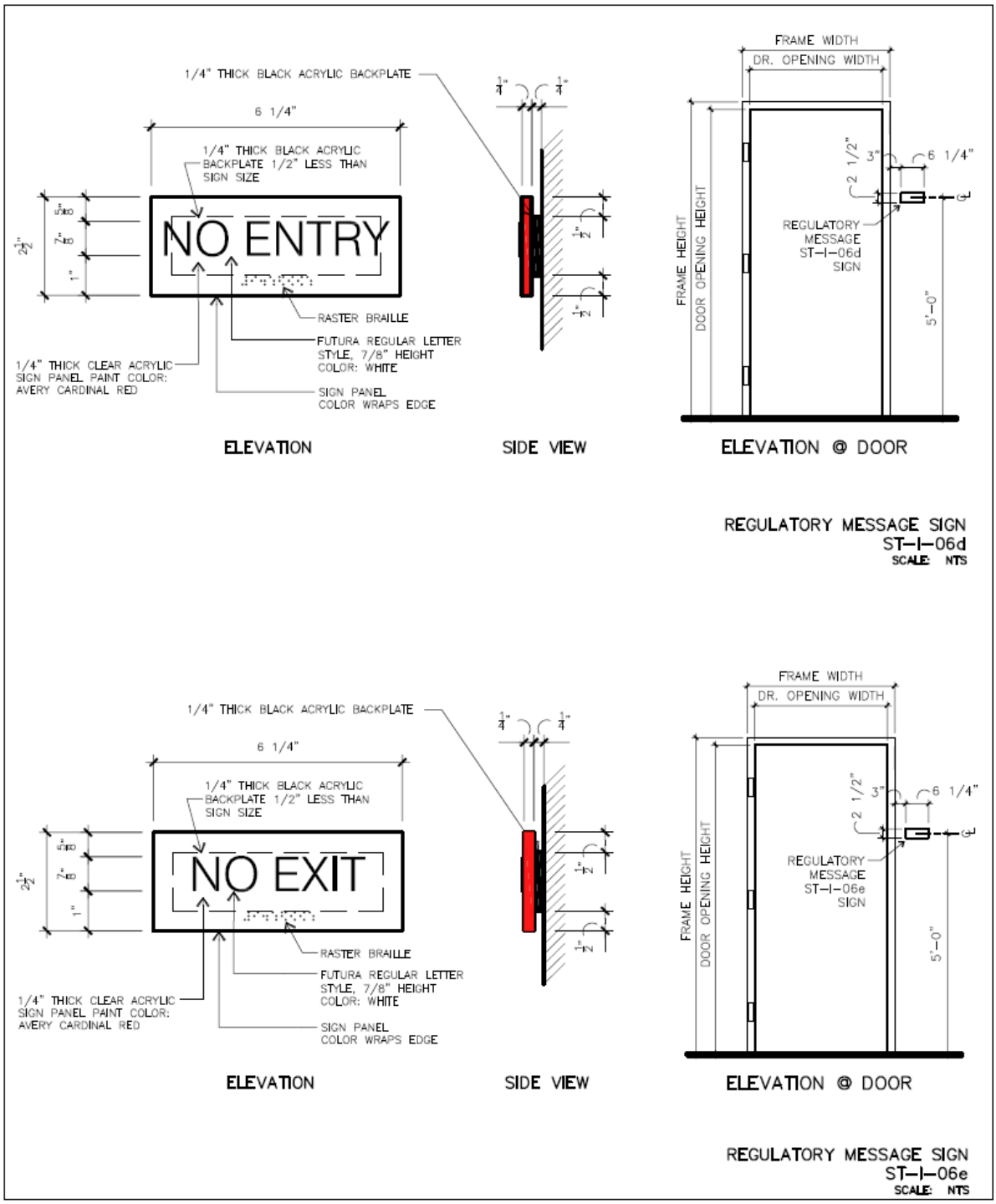

1'-0"
1/4" THICK CLEAR ACRYLIC SIGN PANEL (PAINT COLOR WHITE)
10"
THE OCCUPANCY LOAD OF THIS ROOM IS 45
THIS NUMBER SHALL NOT BE EXCEEDED PER ORDER OF THE FIRE MARSHAL
FUTURA REGULAR LETTER STYLE, 7/8" HEIGHT COLOR: BLACK, VINYL APPLIED TO SURFACE
FUTURA REGULAR LETTER STYLE, 7/8" HEIGHT COLOR: AVERY CARDINAL RED, VINYL APPLIED TO SURFACE
1/4" THICK BLACK ACRYLIC BACKPLATE
FUTURA REGULAR LETTER STYLE, 5/8" HEIGHT COLOR: AVERY CARDINAL RED, VINYL APPLIED TO SURFACE
ELEVATION
SIDE VIEW
OCCUPANCY LOAD SIGN
SCALE: NTS
FRAME WIDTH
DR. OPENING WIDTH
3"
1'-0"
10"
3"
ROOM OCCUPANCY SIGN
EXISTING ROOM IDENTIFICATION SIGN
FRAME HEIGHT
DOOR OPENING HEIGHT
5'-0"
ELEVATION

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / HC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-06c Occupancy Load

By: JJJ
Date: 10/24/07, 6/2/09 (rev)
File Name: ST-I-06c.dwg

**ST-I-06c**



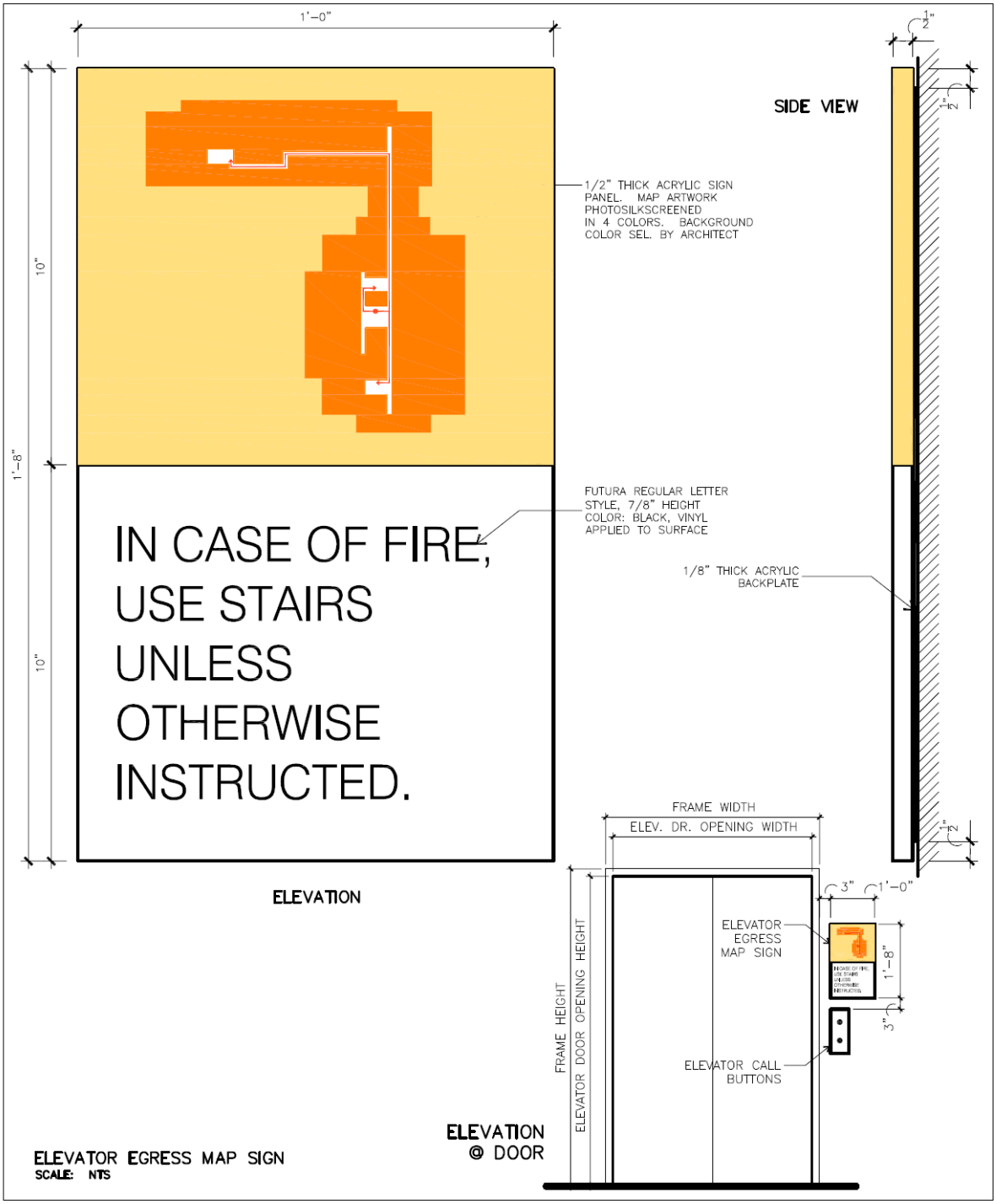

The University of Texas ☆ San Antonio

1604 Campus / Downtown Campus / HSC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-06d & ST-I-06e

By: JJJ
Date: 11/20/07, 6/2/09 (rev)
File Name: ST-I-06d.dwg

## ST-I-06d, ST-I-06e

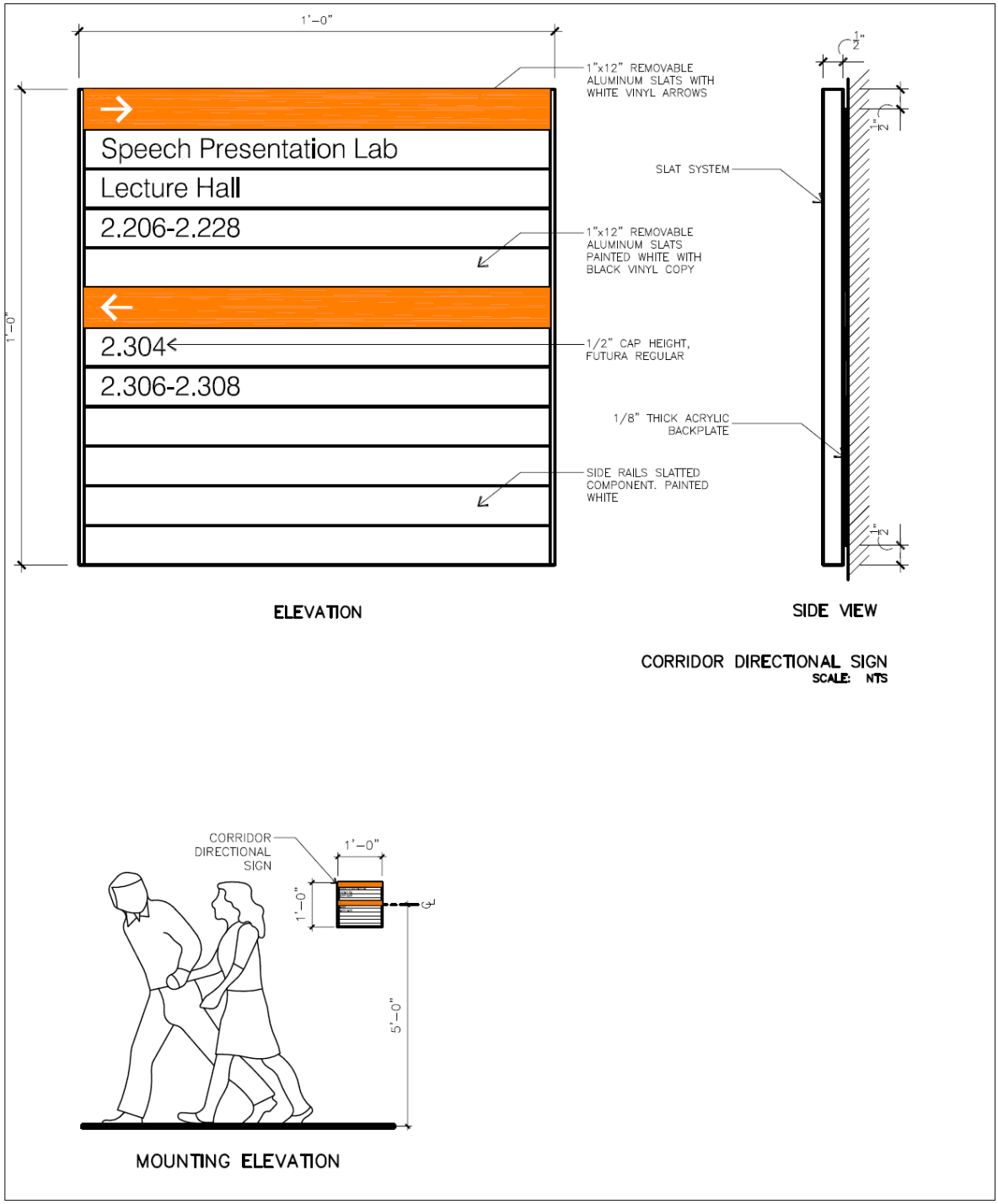



UTSA
The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / ITC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-07 Elevator Egress Map

By: JJJ
Date: 11/20/07
File Name: ST-I-07.dwg

**ST-I-07**

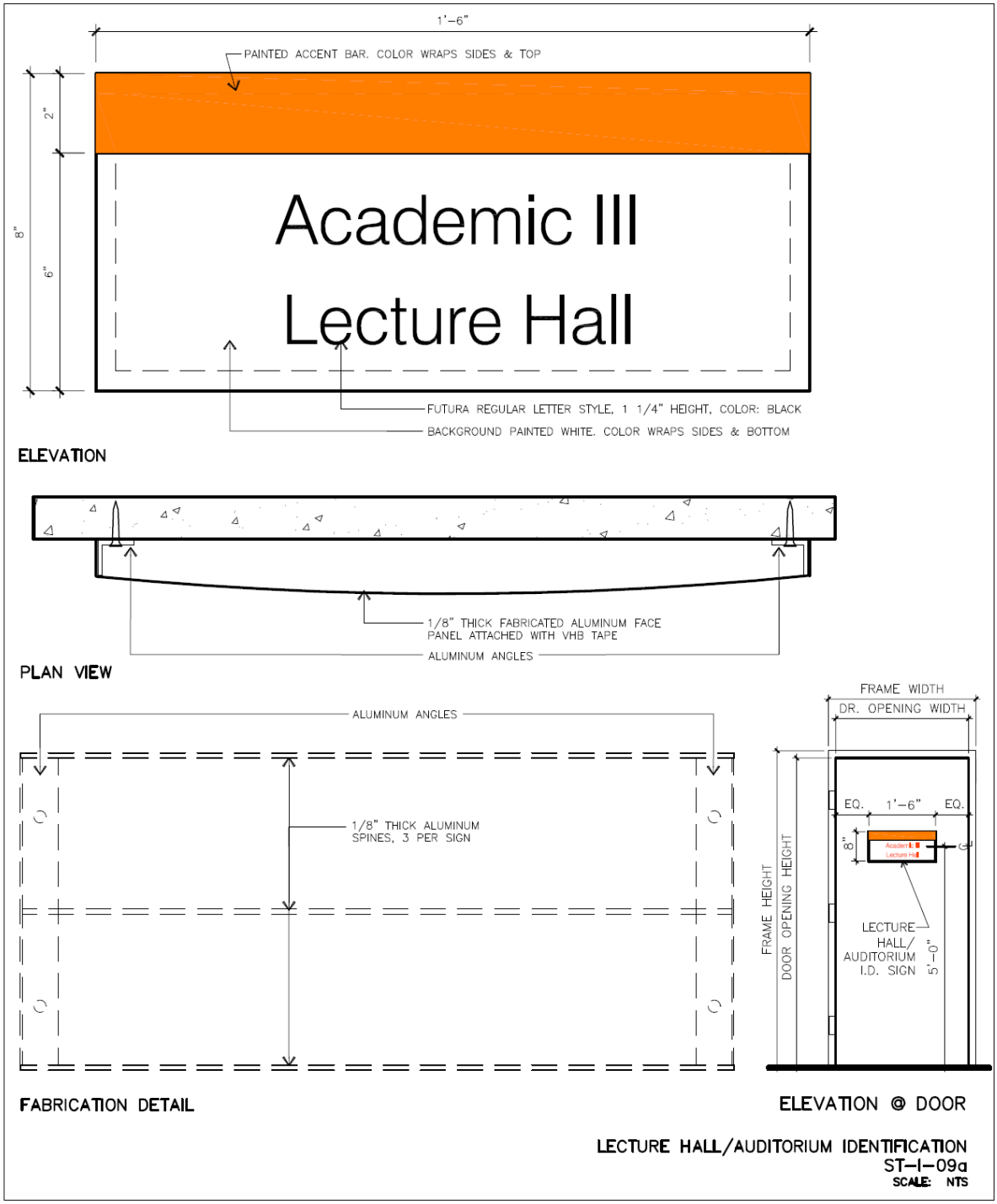



The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / ITC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-08 Corridor Directional

By: JJJ
Date: 11/26/07
File Name: ST-I-08.dwg

**ST-I-08**

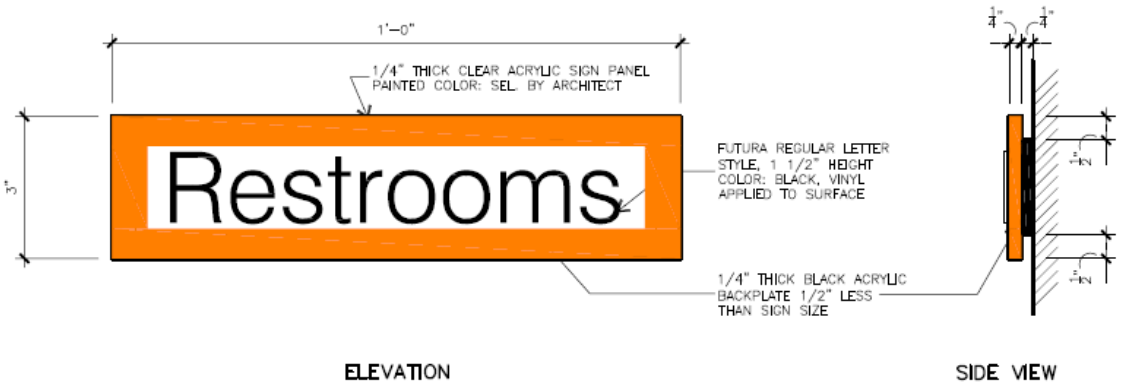



The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / ITC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-09a

By: JJJ
Date: 11/29/07
File Name: ST-I-09a.dwg

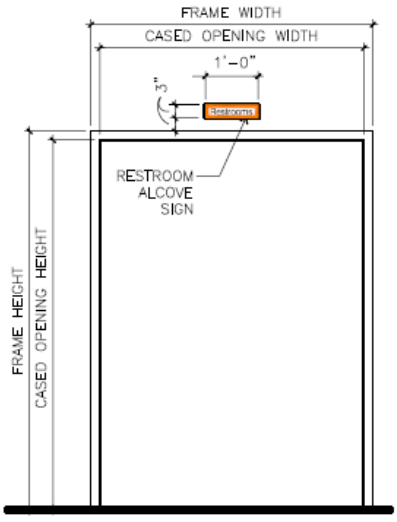
**ST-I-09a**




ELEVATION

SIDE VIEW

RESTROOM ALCOVE IDENTIFICATION
SCALE: NTS



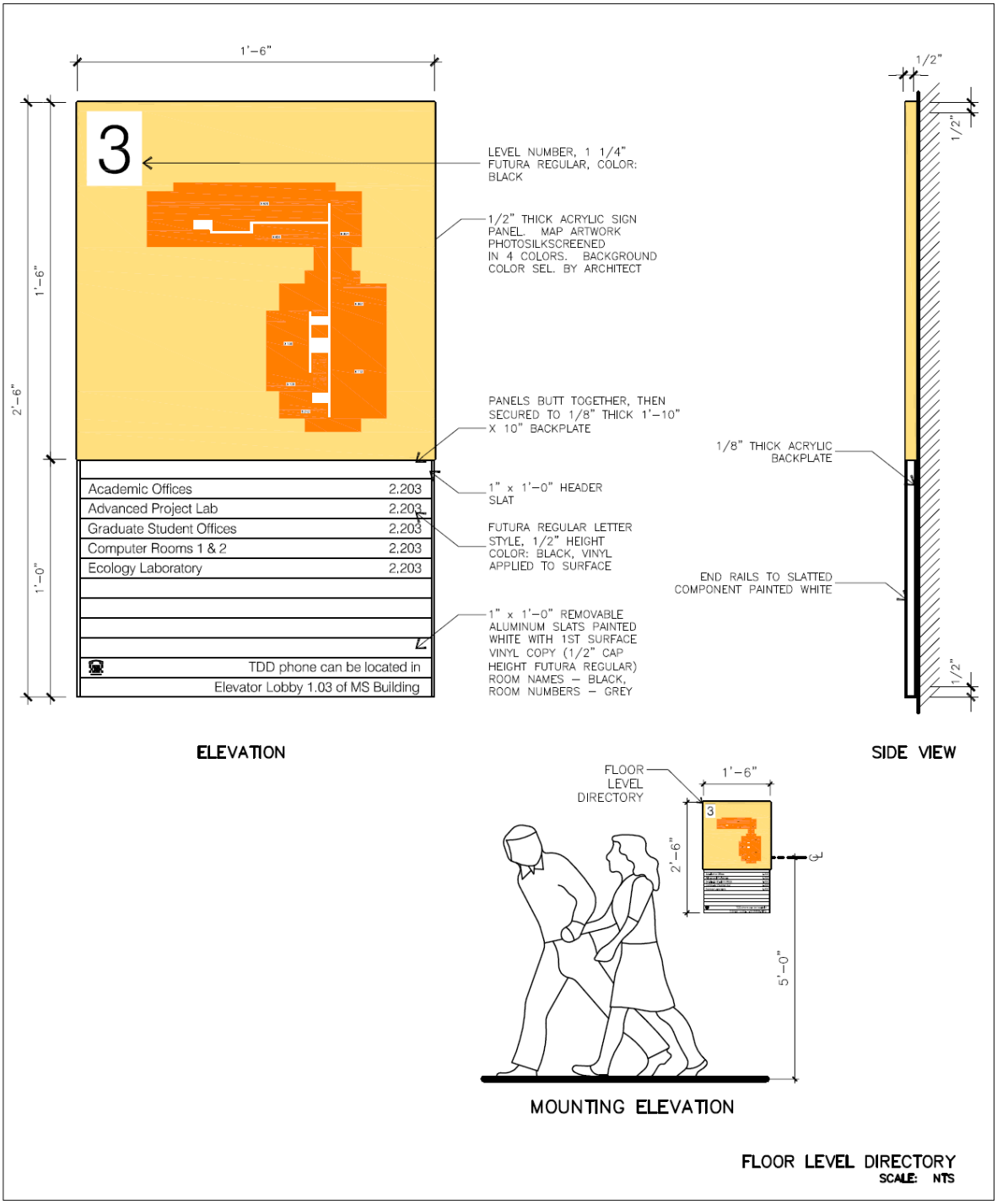

ELEVATION

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / HC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-09b

By: JJJ
Date: 12/03/07, 6/2/09 (rev)
File Name: ST-I-09b.dwg

**ST-I-09b**

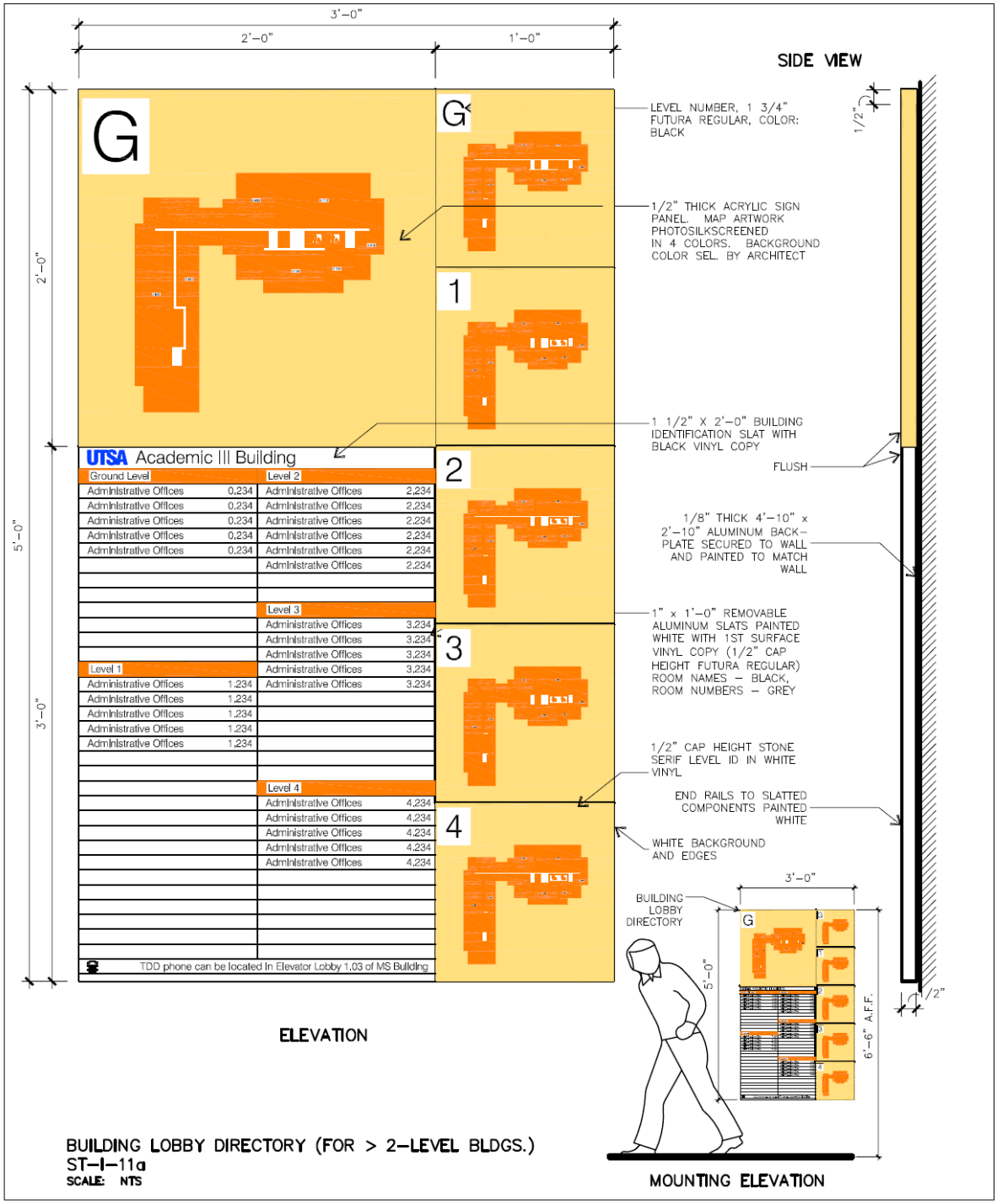

1'-6"
2'-6"
1'-6"
1'-0"
3
LEVEL NUMBER, 1 1/4" FUTURA REGULAR, COLOR: BLACK
1/2" THICK ACRYLIC SIGN PANEL. MAP ARTWORK PHOTOSILKSCREENED IN 4 COLORS. BACKGROUND COLOR SEL. BY ARCHITECT
PANELS BUTT TOGETHER, THEN SECURED TO 1/8" THICK 1'-10" X 10" BACKPLATE
1" x 1'-0" HEADER SLAT
FUTURA REGULAR LETTER STYLE, 1/2" HEIGHT COLOR: BLACK, VINYL APPLIED TO SURFACE
1" x 1'-0" REMOVABLE ALUMINUM SLATS PAINTED WHITE WITH 1ST SURFACE VINYL COPY (1/2" CAP HEIGHT FUTURA REGULAR) ROOM NAMES – BLACK, ROOM NUMBERS – GREY
Academic Offices 2.203
Advanced Project Lab 2.203
Graduate Student Offices 2.203
Computer Rooms 1 & 2 2.203
Ecology Laboratory 2.203
TDD phone can be located in Elevator Lobby 1.03 of MS Building
ELEVATION
1/2"
1/2"
1/8" THICK ACRYLIC BACKPLATE
END RAILS TO SLATTED COMPONENT PAINTED WHITE
1/2"
SIDE VIEW
FLOOR LEVEL DIRECTORY
1'-6"
3
2'-6"
5'-0"
MOUNTING ELEVATION
FLOOR LEVEL DIRECTORY
SCALE: NTS

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / ITC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-10 Floor Level Directory

By: JJJ
Date: 12/10/07
File Name: ST-I-10.dwg

## ST-I-10

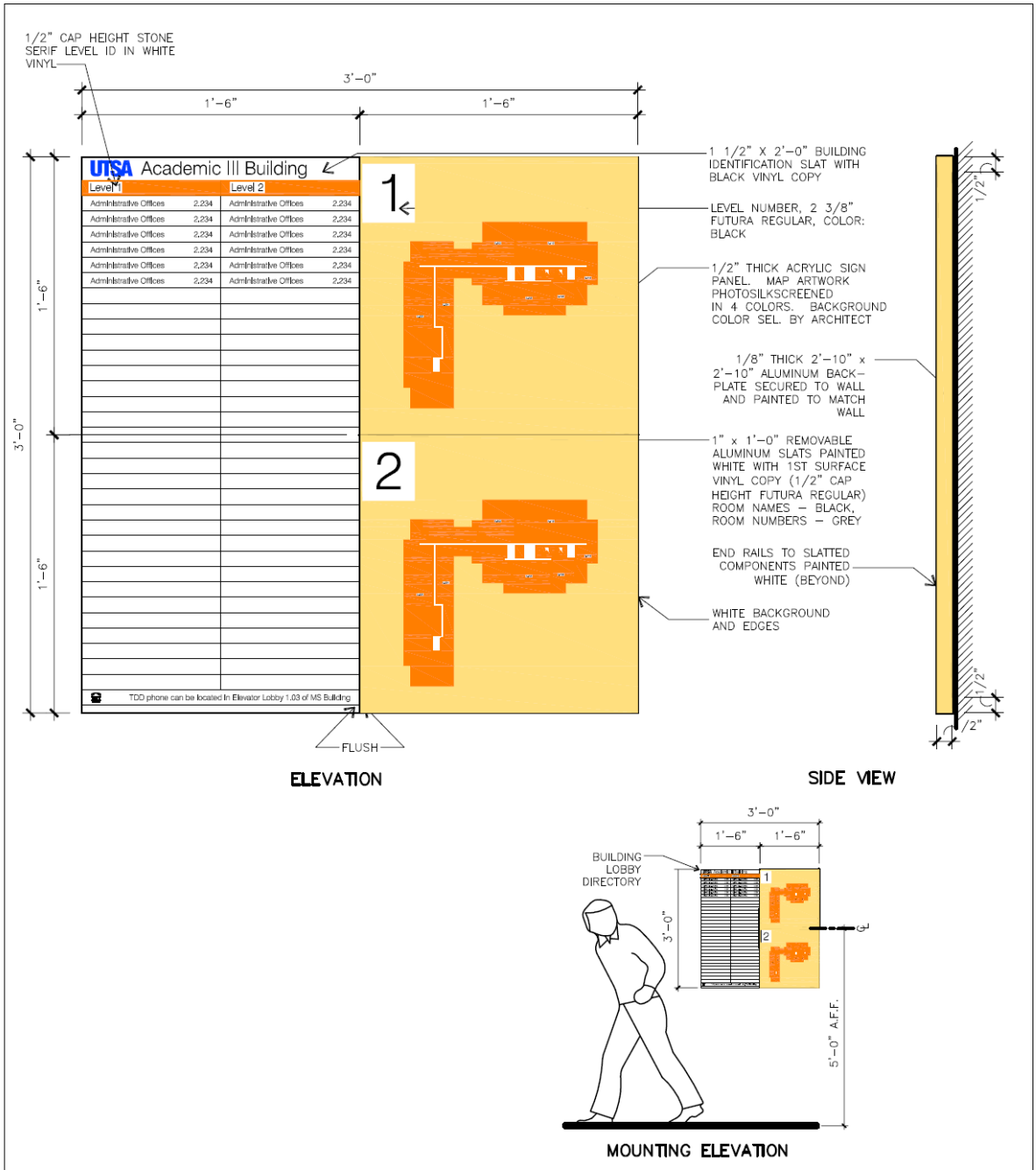

3'–0"
2'–0"
1'–0"
SIDE VIEW
G
1
2
3
4
LEVEL NUMBER, 1 3/4" FUTURA REGULAR, COLOR: BLACK
1/2" THICK ACRYLIC SIGN PANEL. MAP ARTWORK PHOTOSILKSCREENED IN 4 COLORS. BACKGROUND COLOR SEL. BY ARCHITECT
1 1/2" X 2'–0" BUILDING IDENTIFICATION SLAT WITH BLACK VINYL COPY
FLUSH
1/8" THICK 4'–10" x 2'–10" ALUMINUM BACK–PLATE SECURED TO WALL AND PAINTED TO MATCH WALL
1" x 1'–0" REMOVABLE ALUMINUM SLATS PAINTED WHITE WITH 1ST SURFACE VINYL COPY (1/2" CAP HEIGHT FUTURA REGULAR) ROOM NAMES – BLACK, ROOM NUMBERS – GREY
1/2" CAP HEIGHT STONE SERIF LEVEL ID IN WHITE VINYL
END RAILS TO SLATTED COMPONENTS PAINTED WHITE
WHITE BACKGROUND AND EDGES
1/2"
2'–0"
3'–0"
5'–0"
UTSA Academic III Building
Ground Level
Administrative Offices 0,234
Level 1
Administrative Offices 1,234
Level 2
Administrative Offices 2,234
Level 3
Administrative Offices 3,234
Level 4
Administrative Offices 4,234
TDD phone can be located In Elevator Lobby 1.03 of MS Building
ELEVATION
BUILDING LOBBY DIRECTORY
3'–0"
5'–0"
6'–6" A.F.F.
MOUNTING ELEVATION
BUILDING LOBBY DIRECTORY (FOR > 2–LEVEL BLDGS.)
ST–I–11a
SCALE: NTS

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / ITC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-11a Building Lobby Directory

By: JJJ
Date: 12/10/07
File Name: ST-I-11.dwg

## ST-I-11a


1/2" CAP HEIGHT STONE SERIF LEVEL ID IN WHITE VINYL
3'-0"
1'-6"
1'-6"
UTSA Academic III Building
Level 1
Level 2
Administrative Offices 2,234
1
2
TDD phone can be located in Elevator Lobby 1.03 of MS Building
FLUSH
1 1/2" X 2'-0" BUILDING IDENTIFICATION SLAT WITH BLACK VINYL COPY
LEVEL NUMBER, 2 3/8" FUTURA REGULAR, COLOR: BLACK
1/2" THICK ACRYLIC SIGN PANEL. MAP ARTWORK PHOTOSILKSCREENED IN 4 COLORS. BACKGROUND COLOR SEL. BY ARCHITECT
1/8" THICK 2'-10" x 2'-10" ALUMINUM BACK-PLATE SECURED TO WALL AND PAINTED TO MATCH WALL
1" x 1'-0" REMOVABLE ALUMINUM SLATS PAINTED WHITE WITH 1ST SURFACE VINYL COPY (1/2" CAP HEIGHT FUTURA REGULAR) ROOM NAMES - BLACK, ROOM NUMBERS - GREY
END RAILS TO SLATTED COMPONENTS PAINTED WHITE (BEYOND)
WHITE BACKGROUND AND EDGES
1 1/2"
2"
ELEVATION
SIDE VIEW
BUILDING LOBBY DIRECTORY
5'-0" A.F.F.
MOUNTING ELEVATION

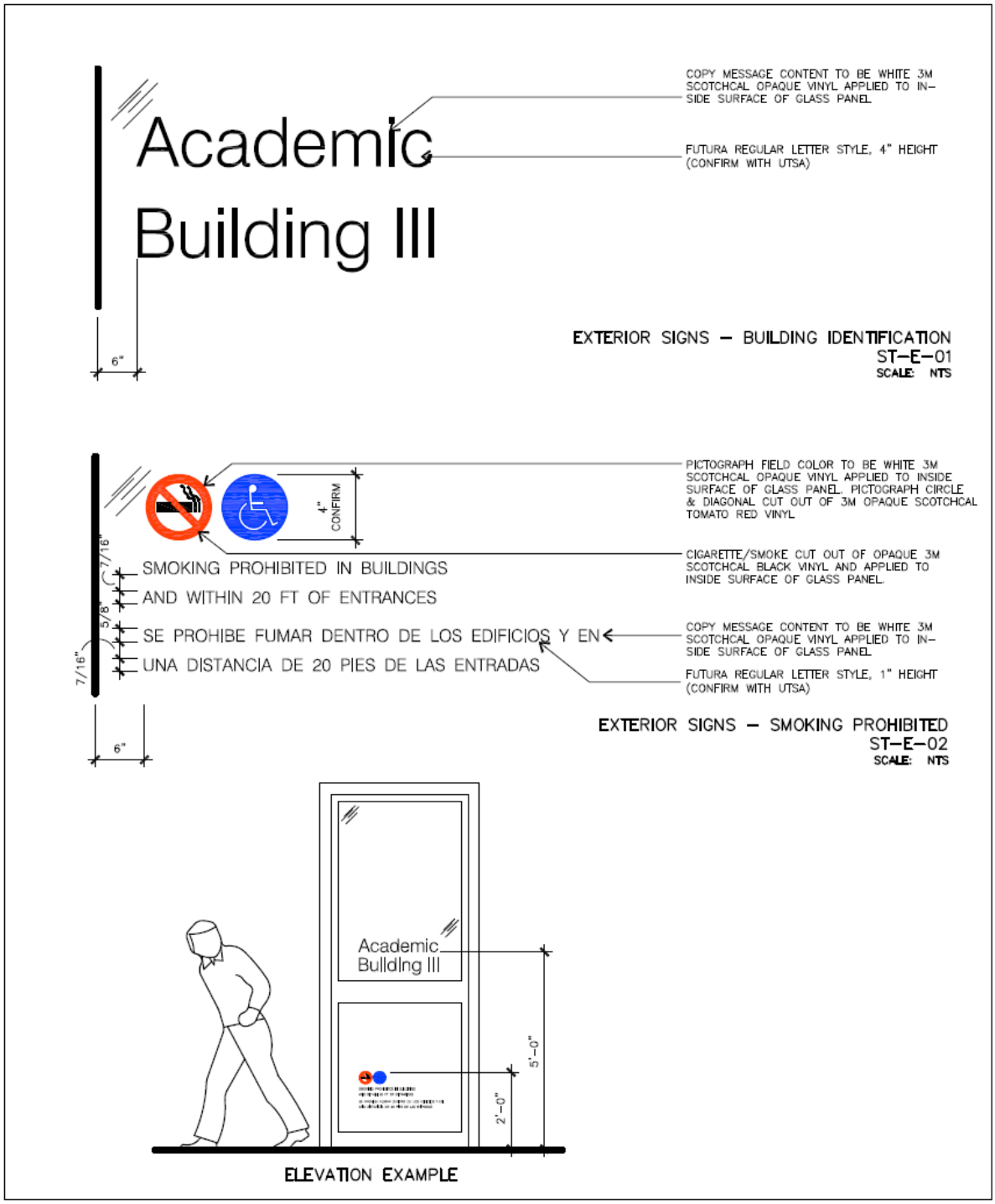
BUILDING LOBBY DIRECTORY (FOR 2-LEVEL BLDGS.)
ST-I-11b
SCALE: NTS

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / ITC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Interior Sign, ST-I-11b Building Lobby Directory

By: JJJ
Date: 12/13/07
File Name: ST-I-11b.dwg

**ST-I-11b**

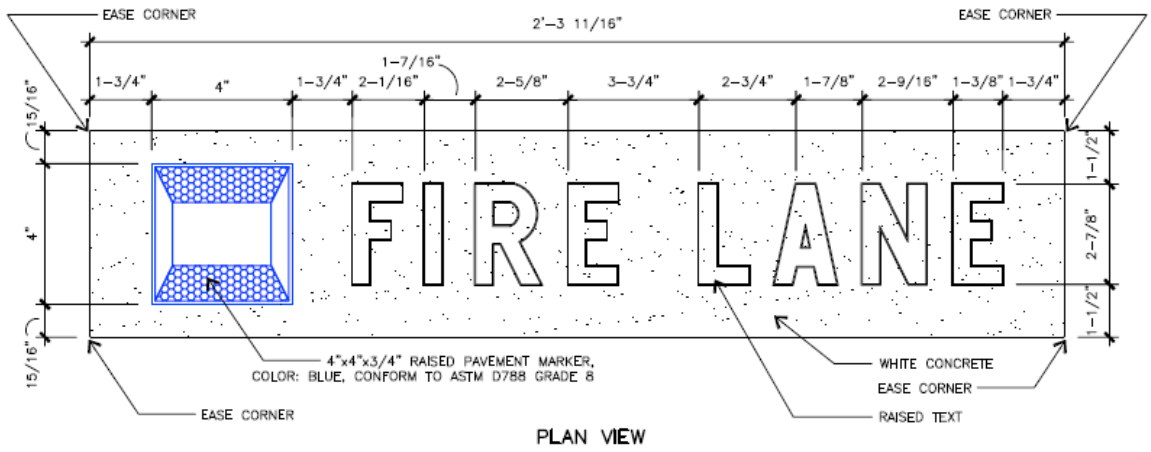

Academic
Building III
COPY MESSAGE CONTENT TO BE WHITE 3M SCOTCHCAL OPAQUE VINYL APPLIED TO IN-SIDE SURFACE OF GLASS PANEL
FUTURA REGULAR LETTER STYLE, 4" HEIGHT (CONFIRM WITH UTSA)
6"
EXTERIOR SIGNS – BUILDING IDENTIFICATION
ST-E-01
SCALE: NTS
4" CONFIRM
PICTOGRAPH FIELD COLOR TO BE WHITE 3M SCOTCHCAL OPAQUE VINYL APPLIED TO INSIDE SURFACE OF GLASS PANEL. PICTOGRAPH CIRCLE & DIAGONAL CUT OUT OF 3M OPAQUE SCOTCHCAL TOMATO RED VINYL
CIGARETTE/SMOKE CUT OUT OF OPAQUE 3M SCOTCHCAL BLACK VINYL AND APPLIED TO INSIDE SURFACE OF GLASS PANEL.
7/16"
5/8"
7/16"
SMOKING PROHIBITED IN BUILDINGS
AND WITHIN 20 FT OF ENTRANCES
SE PROHIBE FUMAR DENTRO DE LOS EDIFICIOS Y EN
UNA DISTANCIA DE 20 PIES DE LAS ENTRADAS
COPY MESSAGE CONTENT TO BE WHITE 3M SCOTCHCAL OPAQUE VINYL APPLIED TO IN-SIDE SURFACE OF GLASS PANEL
FUTURA REGULAR LETTER STYLE, 1" HEIGHT (CONFIRM WITH UTSA)
6"
EXTERIOR SIGNS – SMOKING PROHIBITED
ST-E-02
SCALE: NTS
Academic
Building III
5'-0"
2'-0"
ELEVATION EXAMPLE

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / ITC Campus

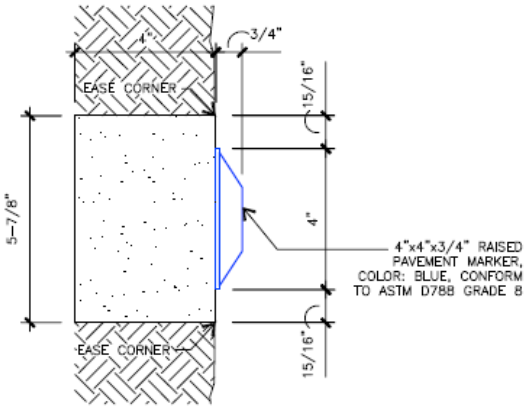
BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Exterior Signs, ST-E-01 & ST-E-02

By: JJJ
Date: 6/02/08, 10/28/10 (rev)
File Name: ST-E-01.dwg

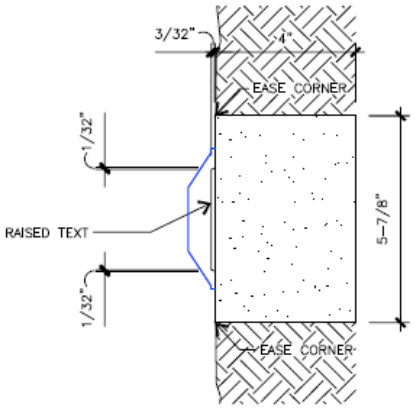
## ST-E-01, ST-E-02




PLAN VIEW




SIDE VIEW




SIDE VIEW

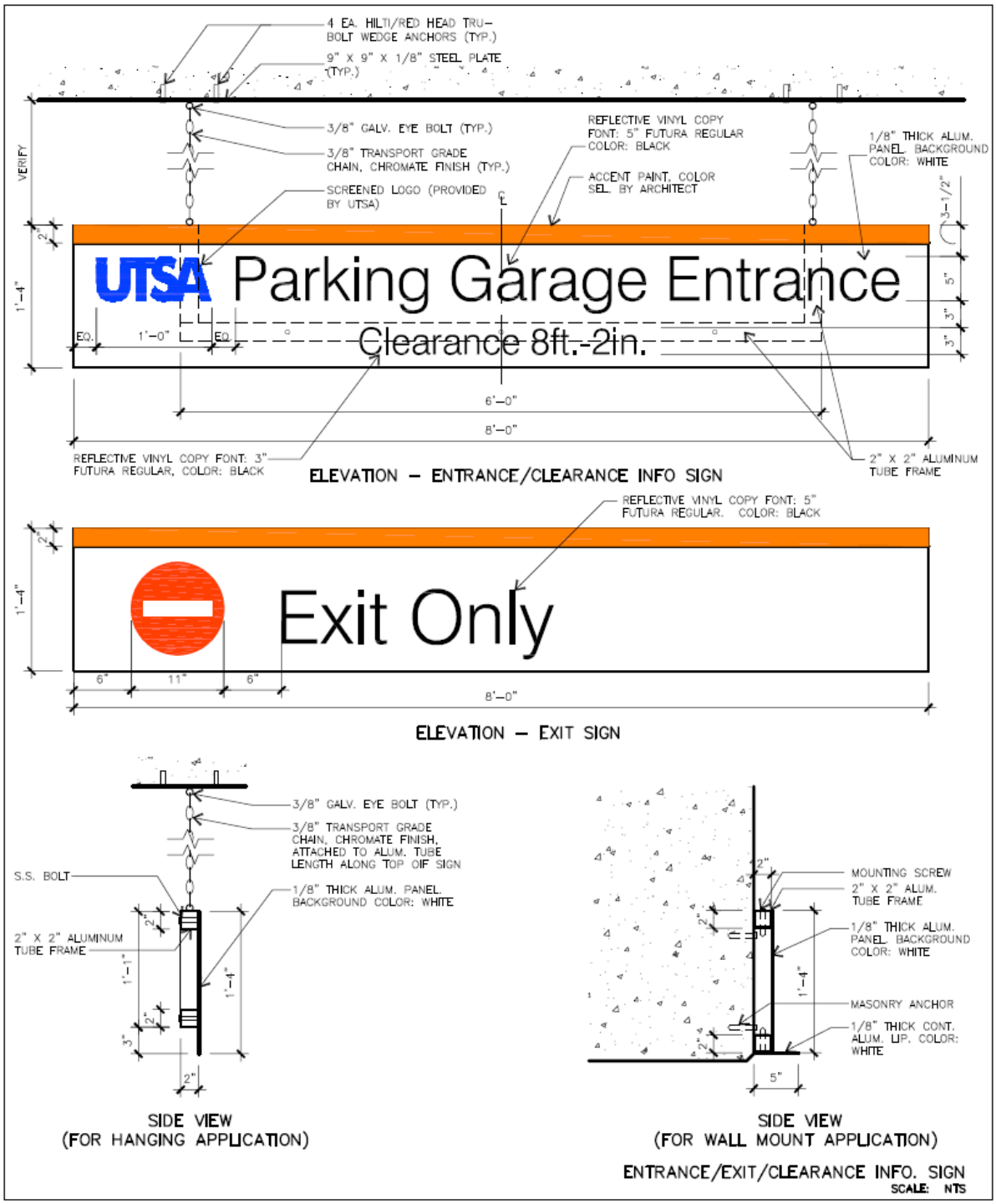
FIRE LANE MARKER
ST-E-03
SCALE: NTS

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / HC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Exterior Signs, ST-E-03 Fire Lane Marker

By: JJJ
Date: 10/19/10
File Name: ST-E-03.dwg

## ST-E-03

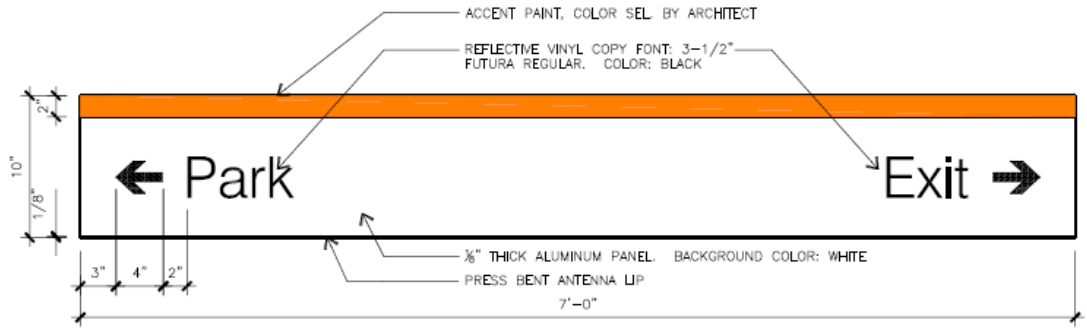

4 EA. HILTI/RED HEAD TRU-BOLT WEDGE ANCHORS (TYP.)
9" X 9" X 1/8" STEEL PLATE (TYP.)
3/8" GALV. EYE BOLT (TYP.)
3/8" TRANSPORT GRADE CHAIN, CHROMATE FINISH (TYP.)
SCREENED LOGO (PROVIDED BY UTSA)
REFLECTIVE VINYL COPY FONT: 5" FUTURA REGULAR COLOR: BLACK
ACCENT PAINT, COLOR SEL. BY ARCHITECT
1/8" THICK ALUM. PANEL, BACKGROUND COLOR: WHITE
VERIFY
UTSA Parking Garage Entrance
Clearance 8ft.-2in.
EQ.
1'-0"
6'-0"
8'-0"
REFLECTIVE VINYL COPY FONT: 3" FUTURA REGULAR, COLOR: BLACK
2" X 2" ALUMINUM TUBE FRAME
ELEVATION – ENTRANCE/CLEARANCE INFO SIGN
REFLECTIVE VINYL COPY FONT: 5" FUTURA REGULAR, COLOR: BLACK
Exit Only
6"
11"
6"
8'-0"
ELEVATION – EXIT SIGN
3/8" GALV. EYE BOLT (TYP.)
3/8" TRANSPORT GRADE CHAIN, CHROMATE FINISH, ATTACHED TO ALUM. TUBE LENGTH ALONG TOP OF SIGN
S.S. BOLT
1/8" THICK ALUM. PANEL, BACKGROUND COLOR: WHITE
2" X 2" ALUMINUM TUBE FRAME
SIDE VIEW (FOR HANGING APPLICATION)
MOUNTING SCREW
2" X 2" ALUM. TUBE FRAME
1/8" THICK ALUM. PANEL, BACKGROUND COLOR: WHITE
MASONRY ANCHOR
1/8" THICK CONT. ALUM. LIP, COLOR: WHITE
SIDE VIEW (FOR WALL MOUNT APPLICATION)
ENTRANCE/EXIT/CLEARANCE INFO. SIGN
SCALE: NTS

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / HSC Campus

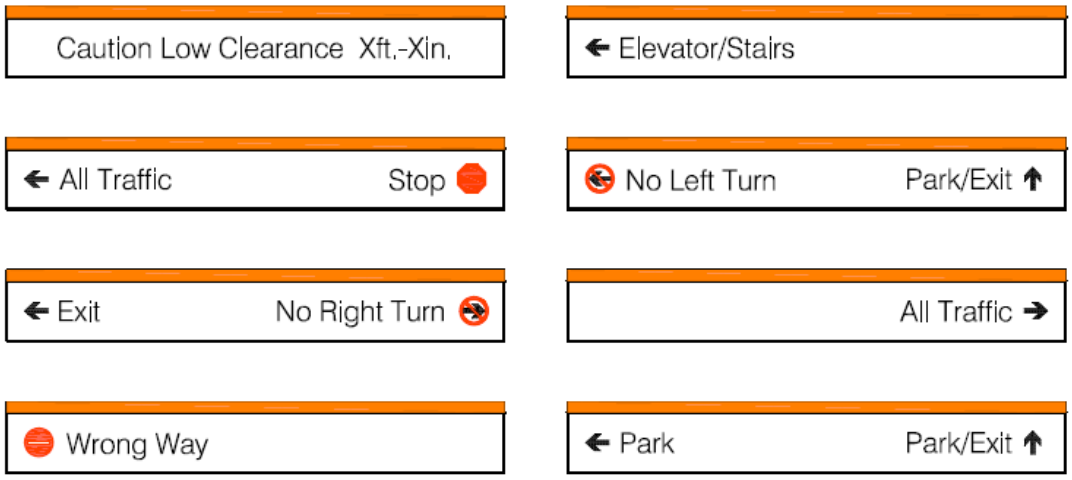
BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Parking Garage Sign, ST-P-01

By: JJJ
Date: 6/03/09
File Name: ST-P-01.dwg

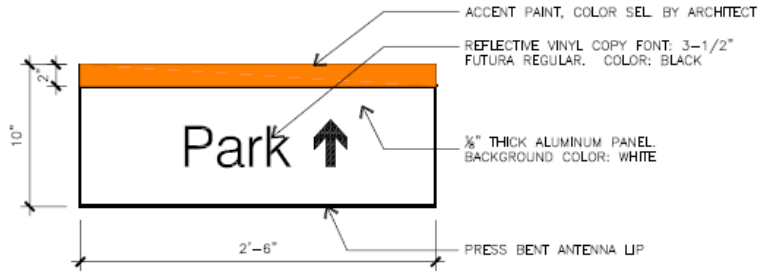
**ST-P-01**



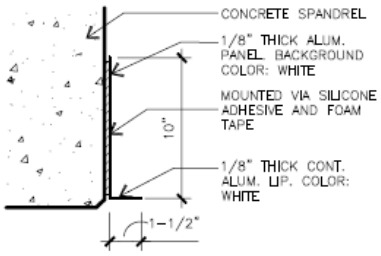

ELEVATION – STANDARD SIZE BEAM MOUNTED OVERHEAD DIRECTIONAL SIGN
(TEXT VARIES)




ELEVATION – SAMPLE SIGNS
(TEXT VARIES PER PROJECT)




ELEVATION – OPTIONAL SMALLER SIZE
OVERHEAD DIRECTIONAL SIGN


CONCRETE SPANDREL
1/8" THICK ALUM. PANEL. BACKGROUND COLOR: WHITE
MOUNTED VIA SILICONE ADHESIVE AND FOAM TAPE
10"
1/8" THICK CONT. ALUM. LIP. COLOR: WHITE
1-1/2"

SIDE VIEW

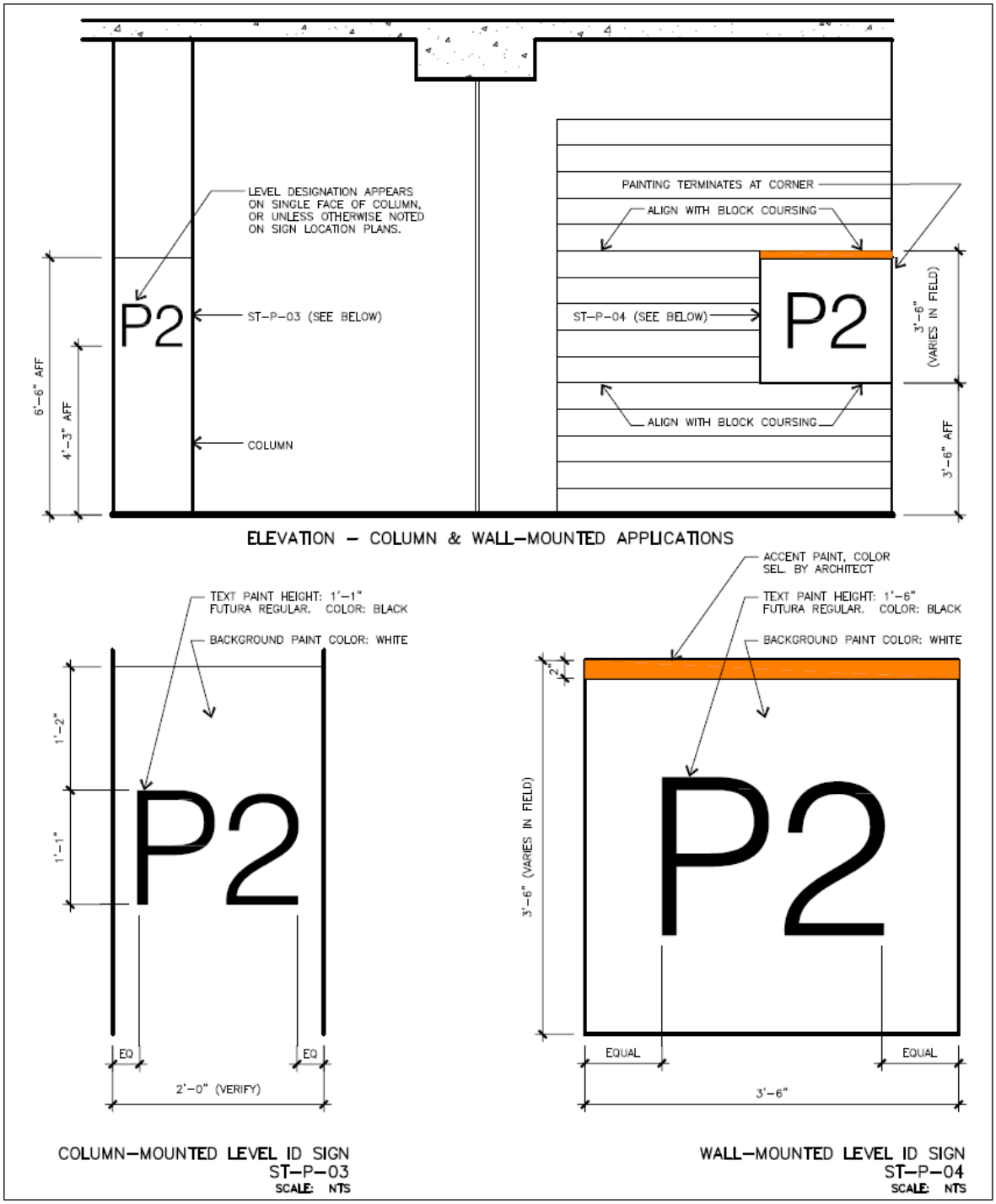
OVERHEAD DIRECTIONAL SIGN
SCALE: NTS

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / HSC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Overhead Directional Sign, ST-P-02

By: JJJ
Date: 6/02/09
File Name: ST-P-02.dwg

**ST-P-02**

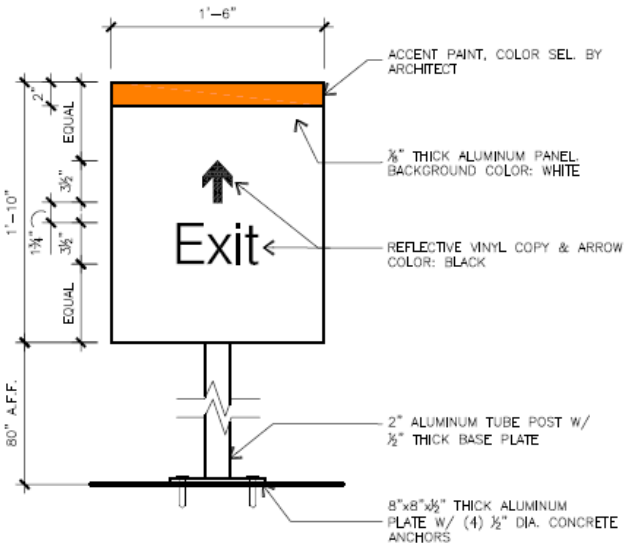



The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / HC Campus

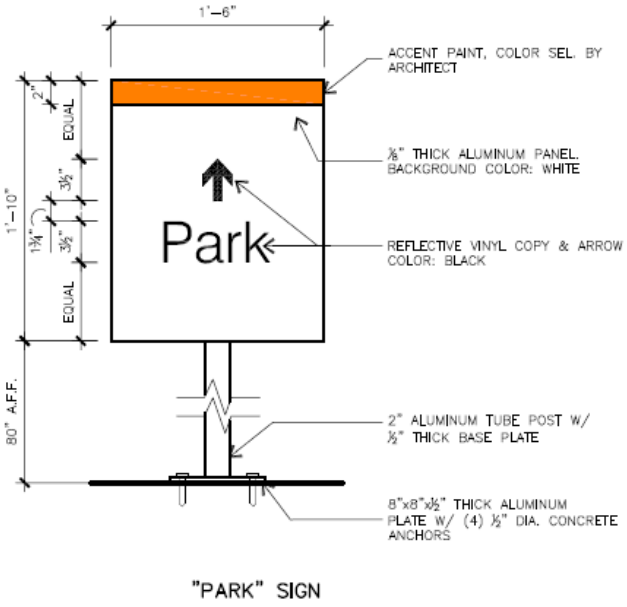
BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Parking Garage Level ID Sign, ST-P-03 & ST-P-04

By: JJJ
Date: 10/19/10
File Name: ST-P-03.dwg

## ST-P-03, ST-P-04




"EXIT" SIGN




"PARK" SIGN

FLOOR MOUNTED DIRECTIONAL SIGN
ST-P-05
SCALE: NTS

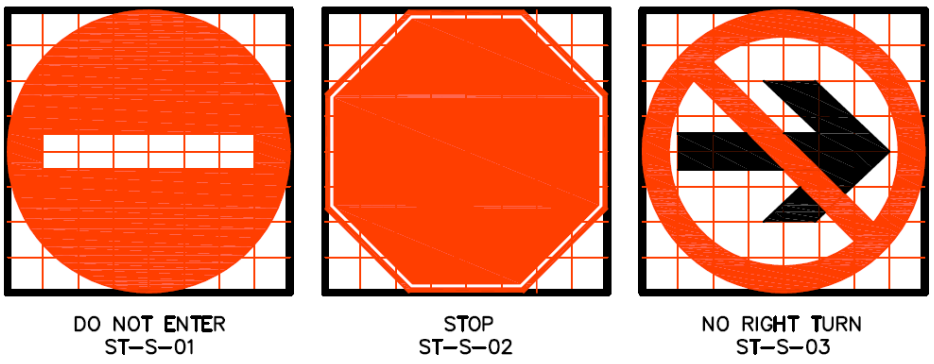
FLOOR MTD. STOP/PEDESTRIAN CROSSING SIGN
ST-P-06
SCALE: NTS

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / HSC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Floor Mounted Signage, ST-P-05 & ST-P-06

By: JJJ
Date: 6/3/2009
File Name: ST-P-05.dwg

## ST-P-05, ST-P-06



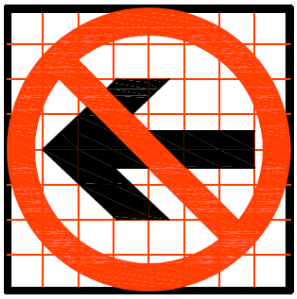
DO NOT ENTER
ST–S–01



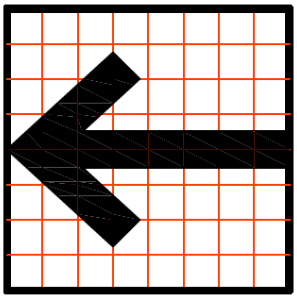
STOP
ST–S–02



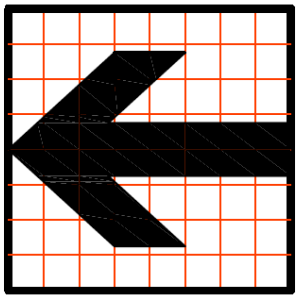
NO RIGHT TURN
ST–S–03



NO LEFT TURN
ST–S–04

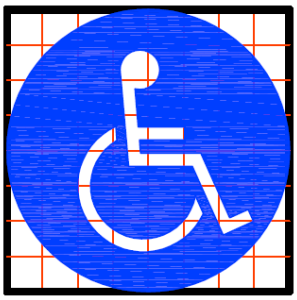


INTERIOR ARROW
ST–S–05



EXTERIOR ARROW
ST–S–06

NO SMOKING
ST–S–07



ACCESSIBILITY
ST–S–08

GRAPHIC SYMBOLS
SCALE: NTS

The University of Texas ☆ San Antonio
1604 Campus / Downtown Campus / ITC Campus

BUILDING SIGNAGE DESIGN STANDARDS (Appendix)
Category: Graphic Symbols, ST-S-01 thru ST-S-08

By: JJJ
Date: 11/26/07
File Name: ST-S-01.dwg

## ST-S-01 thru ST-S-08

Top of Appendix | Table of Contents

*Appendix C*

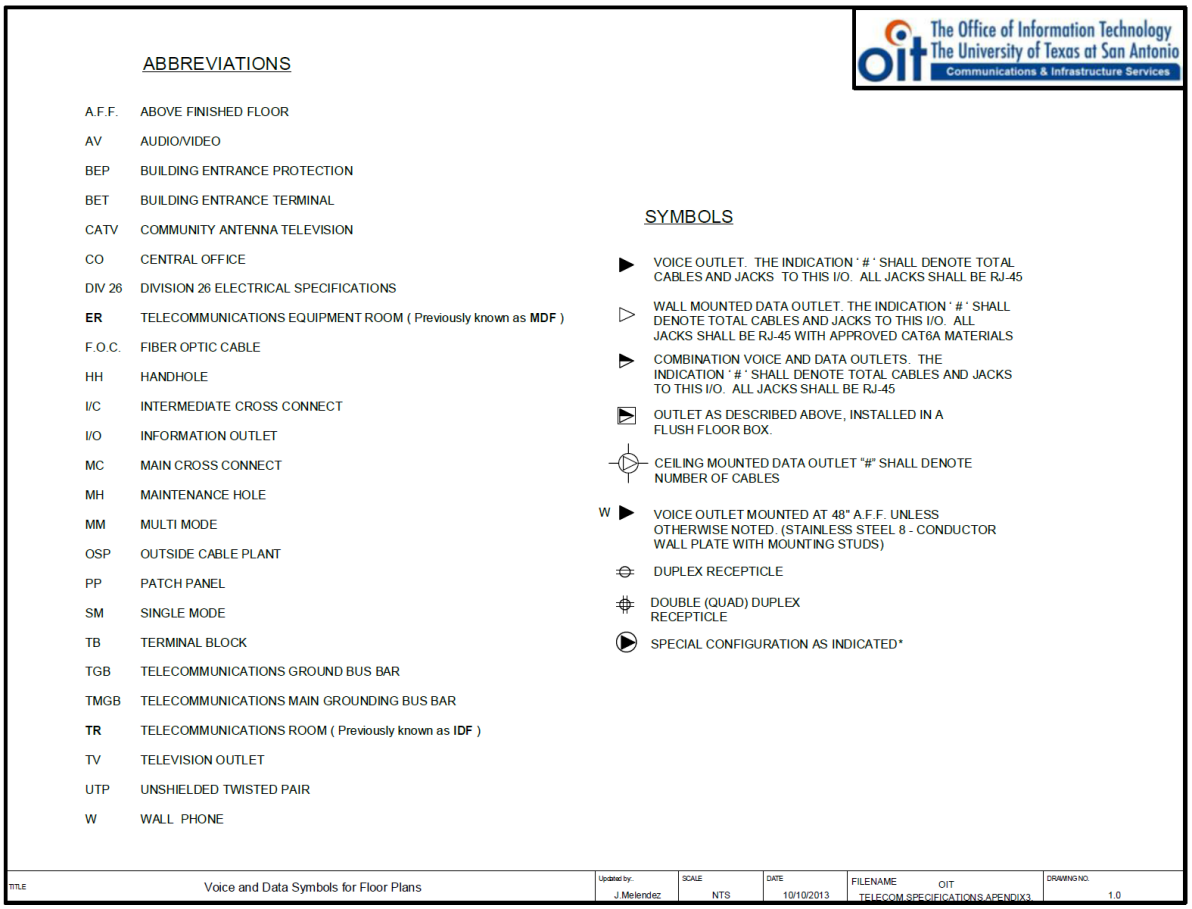
# OIT Standards Graphics

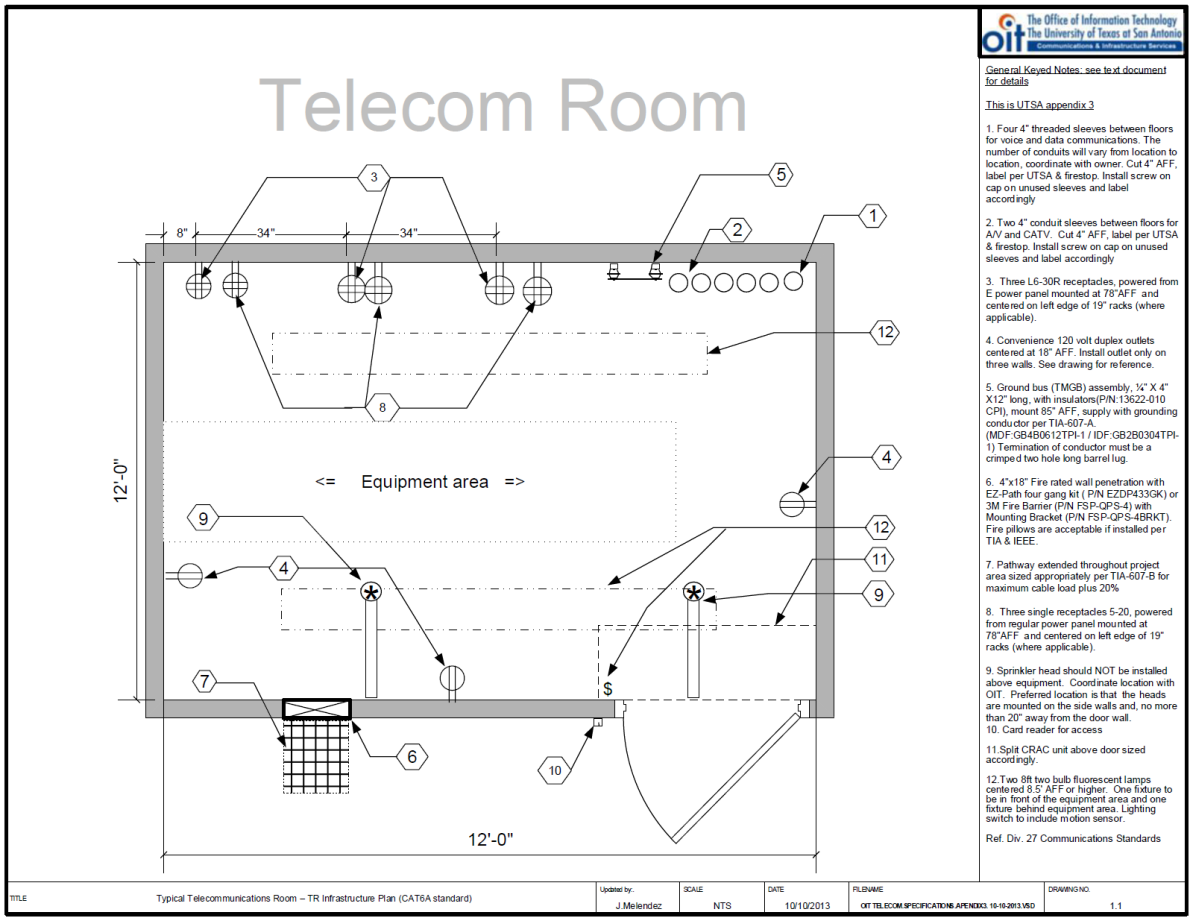
## 1. Overview

The below graphics are to be used in conjunction with the above **Division 27 – Communications Standards** and the **Office of Information Technology Technical Requirements**, which are provided directly by that office. The graphics symbolically represent the typical requirements for Telecommunications (IDF) Rooms; Equipment (MDF) Rooms; cable routing; and labeling of faceplates, riser termination blocks and patch panels. These documents are periodically reviewed and revised by OIT as changes in technology, maintenance or protocol demand.

Physical room layouts may be altered by OIT per the demands or requirements of a specific job. Any deviations to what is presented either below or in the previously-mentioned Standards division and Technical Requirements ***must*** be approved by OIT prior to execution.

## 2. Graphics


The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services
ABBREVIATIONS
A.F.F. ABOVE FINISHED FLOOR
AV AUDIO/VIDEO
BEP BUILDING ENTRANCE PROTECTION
BET BUILDING ENTRANCE TERMINAL
CATV COMMUNITY ANTENNA TELEVISION
CO CENTRAL OFFICE
DIV 26 DIVISION 26 ELECTRICAL SPECIFICATIONS
ER TELECOMMUNICATIONS EQUIPMENT ROOM ( Previously known as MDF )
F.O.C. FIBER OPTIC CABLE
HH HANDHOLE
I/C INTERMEDIATE CROSS CONNECT
I/O INFORMATION OUTLET
MC MAIN CROSS CONNECT
MH MAINTENANCE HOLE
MM MULTI MODE
OSP OUTSIDE CABLE PLANT
PP PATCH PANEL
SM SINGLE MODE
TB TERMINAL BLOCK
TGB TELECOMMUNICATIONS GROUND BUS BAR
TMGB TELECOMMUNICATIONS MAIN GROUNDING BUS BAR
TR TELECOMMUNICATIONS ROOM ( Previously known as IDF )
TV TELEVISION OUTLET
UTP UNSHIELDED TWISTED PAIR
W WALL PHONE
SYMBOLS
VOICE OUTLET. THE INDICATION ' # ' SHALL DENOTE TOTAL CABLES AND JACKS TO THIS I/O. ALL JACKS SHALL BE RJ-45
WALL MOUNTED DATA OUTLET. THE INDICATION ' # ' SHALL DENOTE TOTAL CABLES AND JACKS TO THIS I/O. ALL JACKS SHALL BE RJ-45 WITH APPROVED CAT6A MATERIALS
COMBINATION VOICE AND DATA OUTLETS. THE INDICATION ' # ' SHALL DENOTE TOTAL CABLES AND JACKS TO THIS I/O. ALL JACKS SHALL BE RJ-45
OUTLET AS DESCRIBED ABOVE, INSTALLED IN A FLUSH FLOOR BOX.
CEILING MOUNTED DATA OUTLET "#" SHALL DENOTE NUMBER OF CABLES
W
VOICE OUTLET MOUNTED AT 48" A.F.F. UNLESS OTHERWISE NOTED. (STAINLESS STEEL 8 - CONDUCTOR WALL PLATE WITH MOUNTING STUDS)
DUPLEX RECEPTICLE
DOUBLE (QUAD) DUPLEX RECEPTICLE
SPECIAL CONFIGURATION AS INDICATED*
TITLE
Voice and Data Symbols for Floor Plans
Updated by:
J.Melendez
SCALE
NTS
DATE
10/10/2013
FILENAME
OIT TELECOM.SPECIFICATIONS.APENDIX3.
DRAWING NO.
1.0




The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services

General Keyed Notes: see text document for details

This is UTSA appendix 3

1. Four 4" threaded sleeves between floors for voice and data communications. The number of conduits will vary from location to location, coordinate with owner. Cut 4" AFF, label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

2. Two 4" conduit sleeves between floors for A/V and CATV. Cut 4" AFF, label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

3. Three L6-30R receptacles, powered from E power panel mounted at 78"AFF and centered on left edge of 19" racks (where applicable).

4. Convenience 120 volt duplex outlets centered at 18" AFF. Install outlet only on three walls. See drawing for reference.

5. Ground bus (TMGB) assembly, ¼" X 4" X12" long, with insulators(P/N:13622-010 CPI), mount 85" AFF, supply with grounding conductor per TIA-607-A. (MDF:GB4B0612TPI-1 / IDF:GB2B0304TPI-1) Termination of conductor must be a crimped two hole long barrel lug.

6. 4"x18" Fire rated wall penetration with EZ-Path four gang kit ( P/N EZDP433GK) or 3M Fire Barrier (P/N FSP-QPS-4) with Mounting Bracket (P/N FSP-QPS-4BRKT). Fire pillows are acceptable if installed per TIA & IEEE.

7. Pathway extended throughout project area sized appropriately per TIA-607-B for maximum cable load plus 20%

8. Three single receptacles 5-20, powered from regular power panel mounted at 78"AFF and centered on left edge of 19" racks (where applicable).

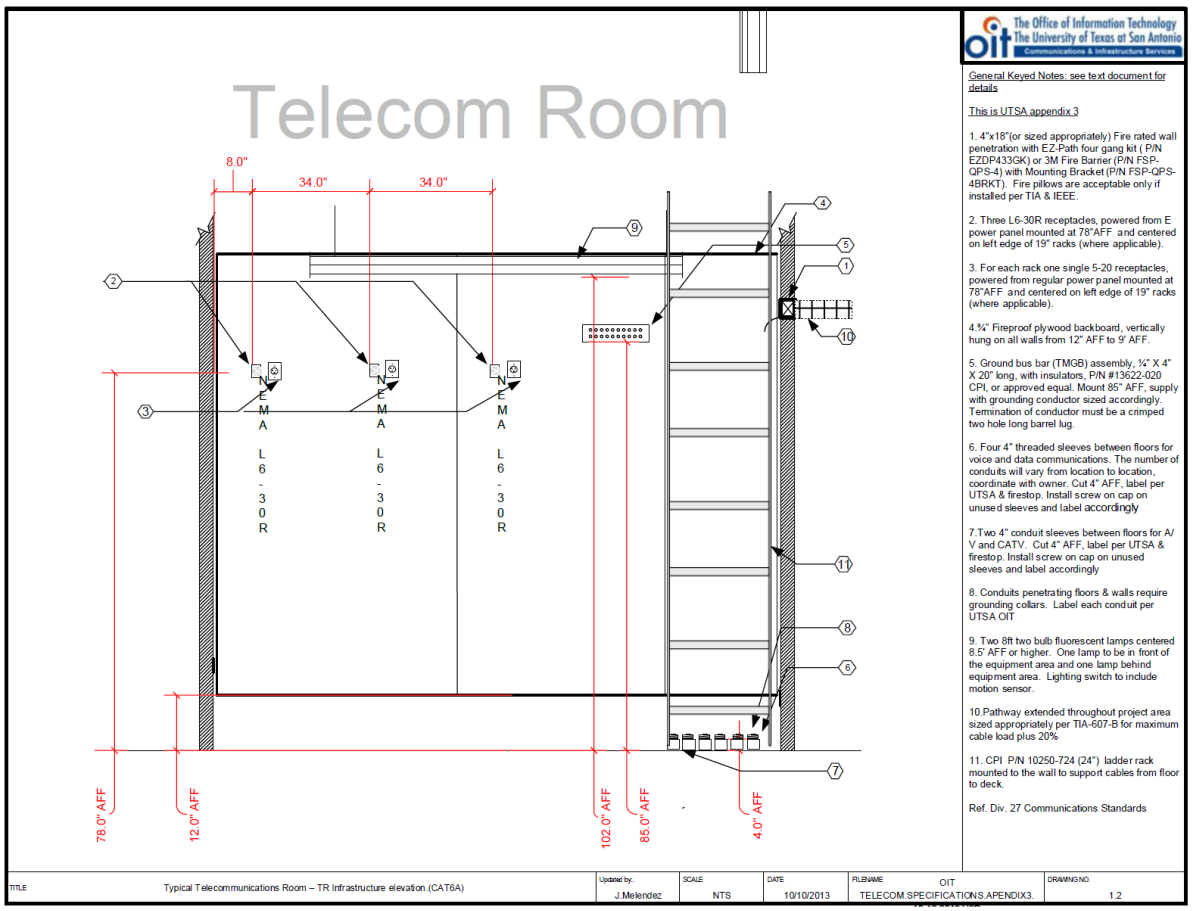
9. Sprinkler head should NOT be installed above equipment. Coordinate location with OIT. Preferred location is that the heads are mounted on the side walls and, no more than 20" away from the door wall.
10. Card reader for access

11.Split CRAC unit above door sized accordingly.

12.Two 8ft two bulb fluorescent lamps centered 8.5' AFF or higher. One fixture to be in front of the equipment area and one fixture behind equipment area. Lighting switch to include motion sensor.

Ref. Div. 27 Communications Standards

| TITLE | Updated by: | SCALE | DATE | FILENAME | DRAWING NO. |
|---|---|---|---|---|---|
| Typical Telecommunications Room – TR Infrastructure Plan (CAT6A standard) | J.Melendez | NTS | 10/10/2013 | OIT TELECOM.SPECIFICATIONS.APENDIX3. 10-10-2013.VSD | 1.1 |




The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services

General Keyed Notes: see text document for details

This is UTSA appendix 3

1. 4"x18"(or sized appropriately) Fire rated wall penetration with EZ-Path four gang kit ( P/N EZDP433GK) or 3M Fire Barrier (P/N FSP-QPS-4) with Mounting Bracket (P/N FSP-QPS-4BRKT). Fire pillows are acceptable only if installed per TIA & IEEE.

2. Three L6-30R receptacles, powered from E power panel mounted at 78"AFF and centered on left edge of 19" racks (where applicable).

3. For each rack one single 5-20 receptacles, powered from regular power panel mounted at 78"AFF and centered on left edge of 19" racks (where applicable).

4.¾" Fireproof plywood backboard, vertically hung on all walls from 12" AFF to 9' AFF.

5. Ground bus bar (TMGB) assembly, ¼" X 4" X 20" long, with insulators, P/N #13622-020 CPI, or approved equal. Mount 85" AFF, supply with grounding conductor sized accordingly. Termination of conductor must be a crimped two hole long barrel lug.

6. Four 4" threaded sleeves between floors for voice and data communications. The number of conduits will vary from location to location, coordinate with owner. Cut 4" AFF, label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

7.Two 4" conduit sleeves between floors for A/V and CATV. Cut 4" AFF, label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

8. Conduits penetrating floors & walls require grounding collars. Label each conduit per UTSA OIT

9. Two 8ft two bulb fluorescent lamps centered 8.5' AFF or higher. One lamp to be in front of the equipment area and one lamp behind equipment area. Lighting switch to include motion sensor.

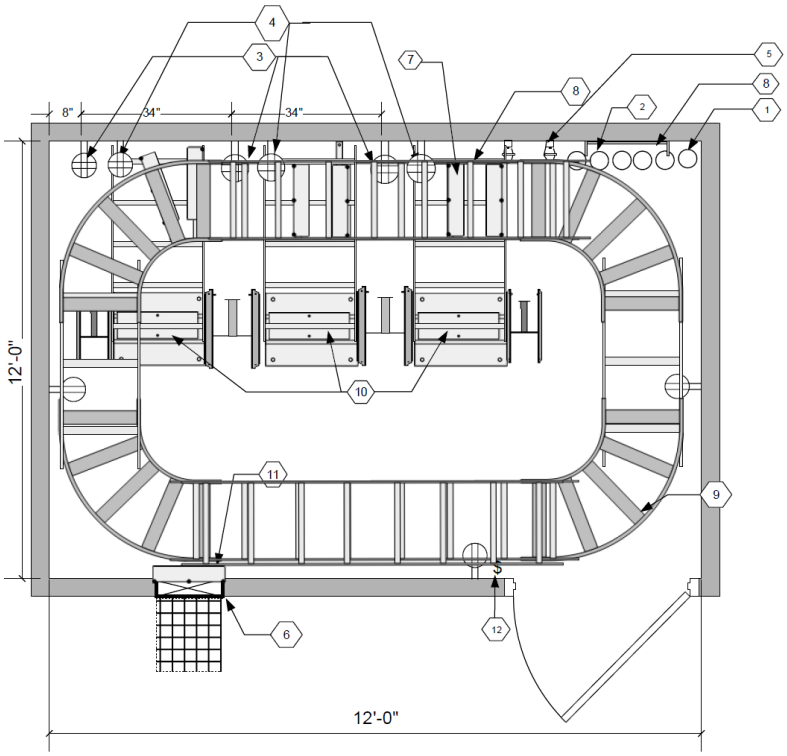
10.Pathway extended throughout project area sized appropriately per TIA-607-B for maximum cable load plus 20%

11. CPI P/N 10250-724 (24") ladder rack mounted to the wall to support cables from floor to deck.

Ref. Div. 27 Communications Standards

| TITLE | Updated by: | SCALE | DATE | FILENAME | DRAWING NO. |
|---|---|---|---|---|---|
| Typical Telecommunications Room – TR Infrastructure elevation.(CAT6A) | J.Melendez | NTS | 10/10/2013 | OIT TELECOM.SPECIFICATIONS.APENDIX3. | 1.2 |

# Telecom Room




The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services

General Keyed Notes: see text document for details

This is UTSA appendix 3

This work by General Contractor and Div. 26:

**1.** Four 4" threaded sleeves between floors for voice and data communications. The number of conduits will vary from location to location, coordinate with owner. Cut 4" AFF, label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

**2.** Two 4" conduit sleeves between floors for A/V and CATV. Cut 4" AFF, label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

**3.** Three L6-30R receptacles, powered from E power panel mounted at 78"AFF and centered on left edge of 19" racks (where applicable).

**4.** Three single 5-20 receptacles, powered from regular power panel mounted at 78"AFF and centered on left edge of each 19" racks (where applicable).

**5.** Ground bus bar (TMGB) assembly, ¼" X 4" X12" long, with insulators(P/N:13622-010 CPI), mount 15" AFF, supply with grounding conductor per TIA-607-A. (MDF:GB4B0612TPI-1 / IDF:GB2B0304TPI-1) Termination of conductor must be a crimped two hole long barrel lug.

**6.** 4"x18" Fire rated wall penetration with EZ-Path four gang kit ( P/N EZDP433GK) or 3M Fire Barrier (P/N FSP-QPS-4) with Mounting Bracket (P/N FSP-QPS-4BRKT). Fire pillows are acceptable only when installed per TIA & IEEE. See Standards

This work by Cabling Contractor

**7.** CPI runway radius drop, cross member P/N 12100-718

**8.** CPI ladder rack P/N 10250-718 (18"), with 24" wall bracket P/N 11746-724

**9.** CPI 18" ladder rack E-bend P/N 10822-718 to match above

**10.** 19" x 7' CPI rack, P/N 55053-703 with Panduit vertical cable managers (P/N PRV8 or PRV12) and doors (PRD8 or PRV12), mounted 4' centered from wall to front of rack.

**11.** Radius drop to match cable tray brand (prefer B-Line or Cablofil)

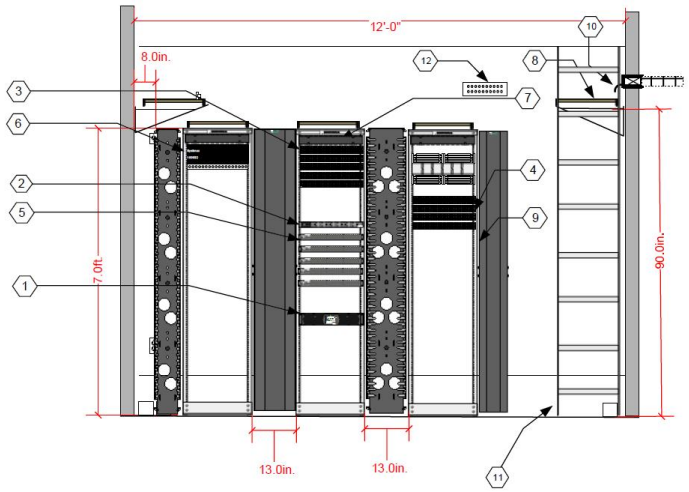
General note:

**12.** Light switch to include motion sensor

***All metallic components (Equipment racks, cabinets, and raceways in IDF must be grounded to the ground bus bar.

| TITLE | Updated by. | SCALE | DATE | FILENAME | DRAWING NO. |
|---|---|---|---|---|---|
| Typical Telecommunications Room -TR Floor Plan (CAT6A standard) | J.Melendez | 1/2" = 1' | 10/10/2013 | OIT TELECOM.SPECIFICATIONS.APENDIX3. 10-10-2013.VSD | 1.3 |

# Telecom Room




The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services

General Keyed Notes: see text document for details

This is UTSA appendix 3

This work by OIT

1. UPS
TripLite - 1500VA 2U
TripLite - 3000VA 2U

2.Power Bar – 6 outlet
P/N P0619FM201 - 20 Amp.
P/N P0617AC133 – 15 AMP
P/N P0619AC133 – Rack Mount

5. Switches
Juniper EX4200-48T – 48Port with 8 POE
Juniper EX4200-24T – 24Port with 8 POE
Juniper EX-PWR-320-AC – Power Supply
Juniper EX-SFP-1GE-SX – Ethernet Optics
Juniper EX-UM-4SFP – 4 port uplink module
SVC-COR-EX4200-48T – J-Care Supt. 1yr 48 port
SVC-COR-EX4200-24T – J-Care Supt. 1yr 24 port

This work by Cabling Contractor

3. Patch Panel
Systimax M2000A-24 1U – Angled 24 port
Systimax M2000A-48 2U – Angled 48 port

4. 110 Patch Panel – RACK MOUNTED
Systimax 110RD2-200-19 – Mounting bracket
Systimax 110DW2-100 – Wiring Blocks
Systimax 110B3 – horizontal cable manager

6. Fiber LIU
Systimax 600G2 – 24 port enclosed LIU
Systimax 1000G2 – 144 port max. enclosed LIU
For wall mounted application use P/N 100A3

7. Horizontal Cable Manager
P/N NM2 –Panduit Horizontal cable management

8. CPI ladder rack P/N 10250-718 (18"), with 24" wall bracket P/N 11746-724
CPI 18" ladder rack E-bend P/N 10822-718 to match above (NOT ILLUSTRATED)

9. 19" x 7' CPI rack, P/N 55053-703 with Panduit vertical cable managers (P/N PRV8 or PRV12) and doors (PRD8 or PRD12), mounted 4' centered from wall to front of rack.

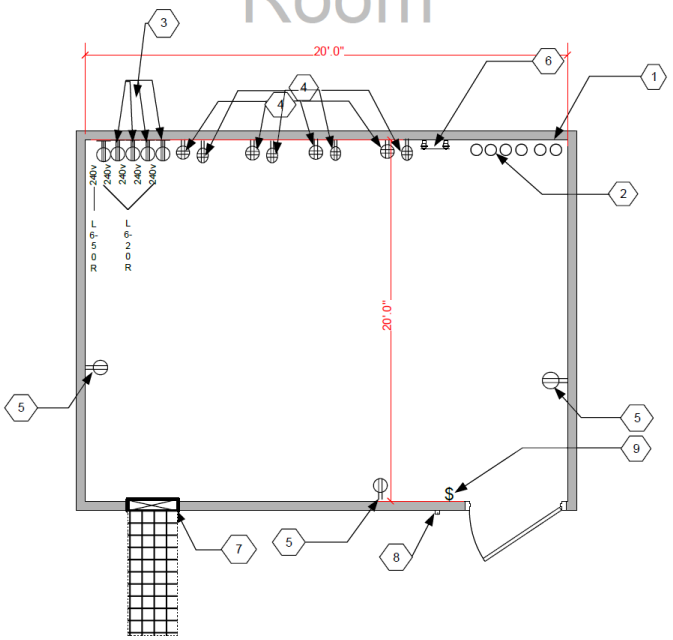
10. Radius drop to match cable tray brand (prefer B-Line or Cablofil)

11.CPI P/N 10250-724 (24") ladder rack mounted to the wall to support cables from floor to deck.

This work by General Contractor

12. Ground bus bar (TMGB) assembly, ¼" X 4" X12" long, with insulators(P/N:13622-010 CPI), mount 85" AFF, supply with grounding conductor per TIA-607-A. (P/N:GB4B0612TPI-1) Termination of conductor must be a crimped two hole long barrel lug.

| TITLE | Updated by. | SCALE | DATE | FILENAME | DRAWING NO. |
|---|---|---|---|---|---|
| Typical Telecommunications Room - TR Equipment Layout | J.Melendez | NTS | 10/10/2013 | OIT TELECOM.SPECIFICATIONS.APENDIX3. 10-10-2013.VSD | 1.4 |




The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services

General Keyed Notes: see text document for details

This is UTSA appendix 3

This work by General Contractor

1. Four 4" conduits from manhole for voice and data communications. The number of conduits will vary from location to location, coordinate with owner. Cut 4" AFF, label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

2. Two 4" conduit sleeves between floors for A/V and CATV. Cut 4" AFF, label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

3. For 1st 19" rack: One special purpose NEMA L6-50R twist lock powered from normal power and four L6-20R powered from E power panel, mounted 8" from left wall and flush mount 78" AFF.

4. For all other four racks. one L6-30R and a single 5-20 receptacle flush mount at 78" AFF and centered on left edge of each 19" rack.

5. Convenience 120 volt duplex outlets mounted 18" AFF. Qty. & separation as per electrical specs. & standards on three wall and no outlet behind equipment racks.

6. Ground bus bar (TMGB) assembly, ¼" X 4" X12" long, with insulators(P/N:13622-010 CPI), mount 85" AFF, supply with grounding conductor per TIA-607-A. (MDF:GB4B0612TPI-1 / IDF:GB2B0304TPI-1) Termination of conductor must be a crimped two hole long barrel lug.

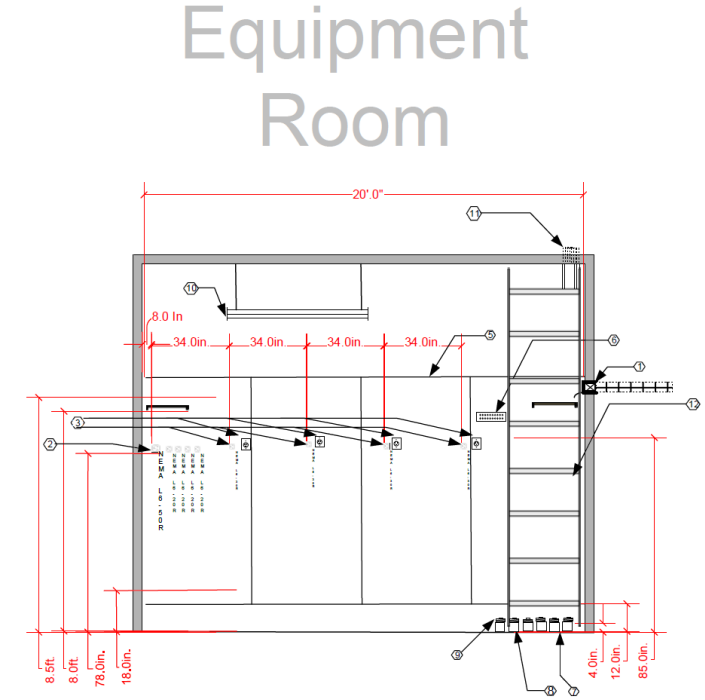
7. One 4"x18" Fire rated wall penetration with EZ-Path four gang kit ( P/N EZDP433GK) or 3M Fire Barrier (P/N FSP-QPS-4) with Mounting Bracket (P/N FSP-QPS-4BRKT). Fire pillows are acceptable only when installed per TIA & IEEE.

8. Card Reader for access.

9. Light switch to include motion sensor.

Ref. Div 27 Communications Standards

| TITLE | Updated by. | SCALE | DATE | FILENAME | DRAWING NO. |
|---|---|---|---|---|---|
| Typical Telecommunications Room -Equipment Room floor plan (CAT6A) | J.Melendez | NTS | 10/10/2013 | OIT TELECOM.SPECIFICATIONS.APENDIX3. 10- | 1.5 |




The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services

General Keyed Notes: see text document for details

This is UTSA appendix 3

This work by General Contractor

1.One 4"x18"(or sized appropriately) Fire rated wall penetration with EZ-Path four gang kit ( P/N EZDP433GK) or 3M Fire Barrier (P/N FSP-QPS-4) with Mounting Bracket (P/N FSP-QPS-4BRKT). Fire pillows are acceptable only when installed per TIA & IEEE.

2. For 1st 19" rack: One special purpose NEMA L6-50R twist lock powered from normal power and four L6-20R powered from E power panel, mounted 8" from left wall and flush mount 78" AFF.

3. For all other four racks. one L6-30R and a single 5-20 receptacle flush mount at 78" AFF and centered on left edge of each 19" rack.

4. Convenience 120 volt duplex outlets mounted 18" AFF. Qty. & separation per electrical specs. & standards on three walls. (No convenience outlet on back wall behind equipment rack)

5.¾" Fireproof plywood backboard, vertically hung from 12" AFF to 9' AFF.

6. Ground bus bar (TMGB) assembly, ¼" X 4" X12" long, with insulators, P/N #13622-010 CPI, or approved equal. Mount 85" AFF, supply with #2 AWG grounding conductor.
Use P/N #13622-020 CPI in MDF.
Termination of conductor must be a crimped two hole long barrel lug.

7. Four 4" conduits from manhole to MDF, rigid metal coupling to all conduits. 4x4" rigid metal threaded end caps. Mule tape ½" wide with distance markings in ft. installed in each conduit (P/N #WP1250O Neptco) and tied off to end cap.

8.Two 4" conduits from manhole to MDF for A/V and CATV. rigid metal coupling to all conduits. 4x4" rigid metal threaded end caps. Mule tape ½" wide with distance markings in ft. installed in each conduit (P/N #WP1250O Neptco) and tied off to end cap.

9. Conduits penetrating floors & walls require grounding collars. Label conduits per UTSA OIT

10. Lamps to be installed at 8.5' AFF or above. Light switch to include motion sensor.

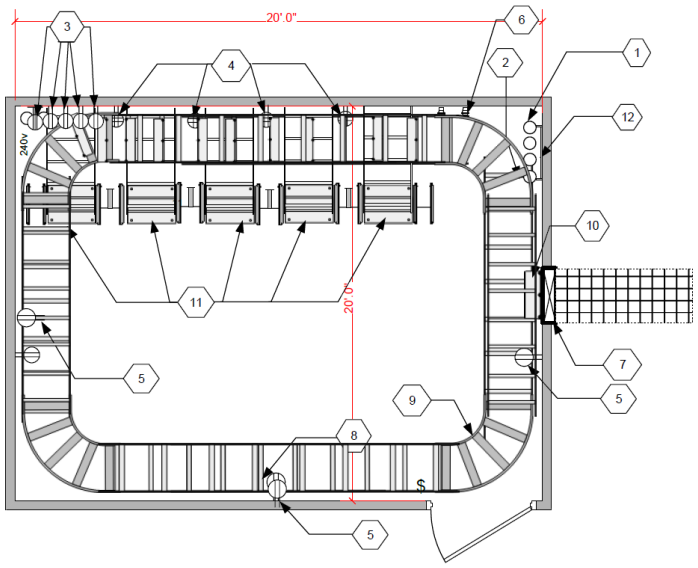
11. In buildings where IDFs are stacked above MDF; Provide 4" Conduit sleeves connecting rooms. 4 sleeves for voice/data communications and 2 sleeves for A/V and CATV. Label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

12. CPI P/N 10250-724 (24") ladder rack mounted to the wall to support cables from floor to deck.

Ref. Div 27 Communications Standards

| TITLE | Updated by. | SCALE | DATE | FILENAME | DRAWING NO. |
|---|---|---|---|---|---|
| Typical Telecommunications Room - Equipment Room Infrastructure Elevation Plan (CAT6A) | J.Melendez | NTS | 10/10/2013 | OIT TELECOM.SPECIFICATIONS.APENDIX3. 10- | 1.6 |

# Equipment Room




The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services

General Keyed Notes: see text document for details

This is UTSA appendix 3

This work by General Contractor and Div. 26.

1. Four 4" conduits from manhole for voice and data communications. The number of conduits will vary from location to location, coordinate with owner. Cut 4" AFF, label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

2. Two 4" conduit sleeves between floors for A/V and CATV. Cut 4" AFF, label per UTSA & firestop. Install screw on cap on unused sleeves and label accordingly

3. For 1st rack provide one special purpose NEMA L6-50R twist lock powered from normal power and four L6-20R powered from E power panel, mounted 8" from left wall and flush mount 78" AFF.

4. Four L5-30R and four single 5-20 receptacles powered from E Power panel flush mount at 78" AFF and centered on left edge of 19" racks (where applicable).

5. Convenience 120 volt duplex outlets mounted 8" AFF. Qty. & separation as per electrical specs. & standards. (No convinience outlet on back wall)

6. Ground bus bar (TMGB) assembly, ¼" X 4" X12" long, with insulators(P/N:13622-010 CPI), mount 15" AFF, supply with grounding conductor per TIA-607-A. (MDF:GB4B0612TPI-1 / IDF:GB2B0304TPI-1) Termination of conductor must be a crimped two hole long barrel lug.

This work by Cabling Contractor

7. One 4"x18" Fire rated wall penetration with EZ-Path four gang kit ( P/N EZDP433GK) or 3M Fire Barrier (P/N FSP-QPS-4) with Mounting Bracket (P/N FSP-QPS-4BRKT). Fire pillows are acceptable only when installed per TIA & IEEE.

8. CPI ladder rack P/N 10250-718 (18"), wall bracket 24" P/N 11746-722

9. CPI 18" ladder rack E-bend P/N 10822-718 to match above

10. Radius drop to match cable tray brand (prefer B-Line or Cablofil)

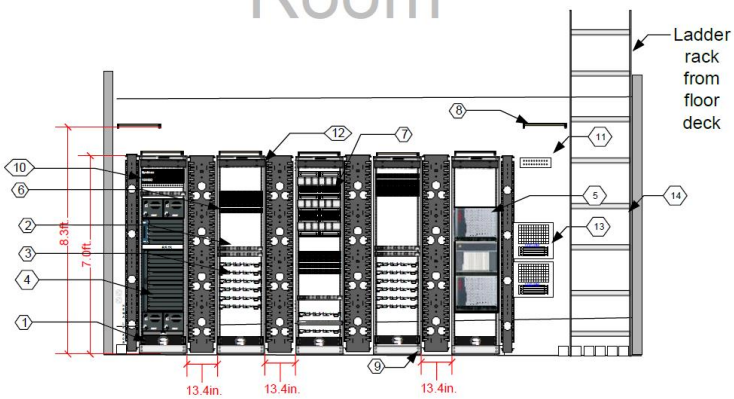
11. 19" x 7' CPI rack, P/N 55053-703 with Panduit vertical cable managers (P/N PRV12) and doors (PRD12), mounted 4" centered from wall to front of rack

12.CPI ladder rack P/N 10250-248 (24"), wall mounted

***All metallic components (Equipment racks, cabinets, and raceways in IDF must be bonded and grounded to the ground bus bar and must terminated with a two hole long barrel Lug.

| TITLE | Updated by. | SCALE | DATE | FILENAME | DRAWING NO. |
|---|---|---|---|---|---|
| Typical Telecommunications Room – Equipment Room floor plan (CAT6A) | J.Melendez | ¼" = 1' | 10/10/2013 | OIT TELECOM.SPECIFICATIONS.APENDIX3. 10- | 1.7 |

# Equipment Room




The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services

General Keyed Notes: see text document for details

This is UTSA appendix 3

This work by OIT

1. UPS - Minuteman E2000RM2U – 2000VA 2U
Minuteman E3000RM2U – 3000VA 2U

2.Power Bar – 6 outlet,
P/N P0619FM201 - 20 Amp.
P/N P0617AC133 – 15 AMP
P/N P0619AC133 – Rack Mount

3. Switches
Juniper EX4200-48T – 48Port with 8 POE
Juniper EX4200-24T – 24Port with 8 POE
Juniper EX-PWR-320-AC – Power Supply
Juniper EX-SFP-1GE-SX – Ethernet Optics
Juniper EX-UM-4SFP – 4 port uplink module
SVC-COR-EX4200-48T – J-Care Supt. 1yr 48 port
SVC-COR-EX4200-24T – J-Care Supt. 1yr 24 port

4. Brocade core

5. Rack mounted Avaya G650 telephone system EPN

This work by Div. 27 Cabling Contractor

6. Patch Panel
Systimax M2000A-24 1U – Angled 24 port
Systimax M2000A-48 2U – Angled 48 port 760049965

7. 110 Patch Panel – RACK MOUNTED
Systimax 110RD2-200-19 – Mounting bracket
Systimax 110DW2-100 – Wiring Blocks
Systimax 110B3 – horizontal cable manager

8. CPI ladder rack P/N 10250-718 (18"), wall bracket for 18" P/N 11746-718 CPI 18" ladder rack E-bend P/N 10822-718 to match above (NOT ILLUSTRATED)

9. 19" x 7' CPI rack, P/N 55053-703 with Panduit vertical cable managers (P/N PRV12) and doors (PRD12), mounted 4" centered from wall to front of rack.

10. Fiber LIU
Systimax 600G2 – 24 port enclosed LIU
Systimax 1000G2 – 144 port max. enclosed LIU
For wall mounted application use P/N 100A3

11. Installed by Div. 26 Ground bus bar (TMGB) assembly, ¼" X 4" X12" long, with insulators(P/N:13622-010 CPI), mount 85" AFF, supply with grounding conductor per TIA-607-A. (P/N GB4B0612TPI-1) Termination of conductor must be a crimped two hole long barrel lug.

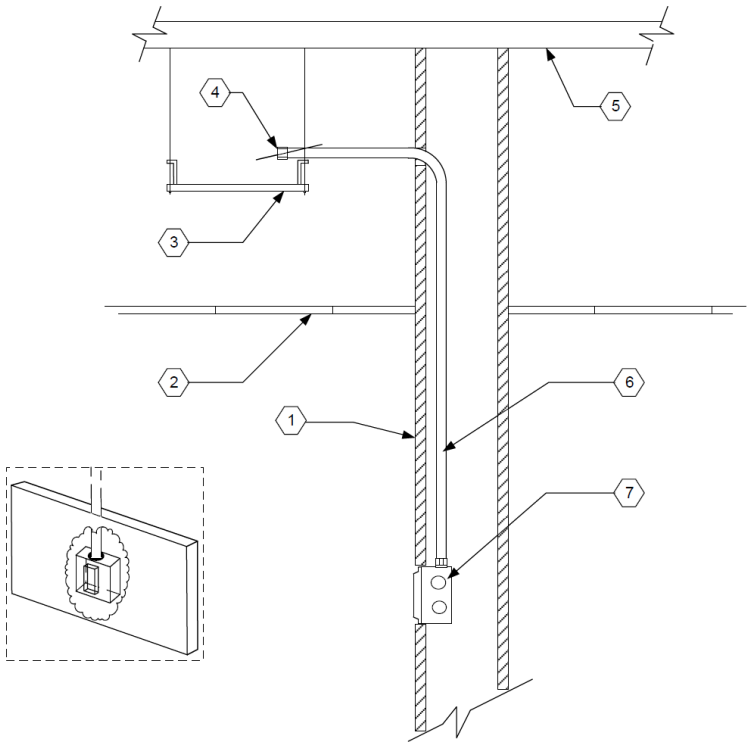
12. Horizontal Cable Manager
P/N NM2 –Panduit Horizontal cable management

13.Circa 1880ENA1/NSC-100G building entrance terminals with gas modules "C4B1E"

14.CPI P/N 10250-724 (24") ladder rack mounted to the wall to support cables from floor to deck.

***All metallic components (Equipment racks, cabinets, and raceways in IDF must be grounded to the ground bus bar and must terminate with a crimped two hole long barrel lug.

| TITLE | Updated by. | SCALE | DATE | FILENAME | DRAWING NO. |
|---|---|---|---|---|---|
| Typical Telecommunications Room – Equipment Room Elevation Plan (CAT6A) | J.Melendez | NTS | 10/10/2013 | OIT TELECOM.SPECIFICATIONS.APENDIX3. 10- | 1.8 |




The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services

General Keyed Notes: see text document for details

This is UTSA appendix 3

1. Wall

2. Lay-in ceiling

3. All cable trays shall be provided and placed in coordination with telecommunications, architectural, and MEP drawings (by Div. 27).

4. Insulated grounding bushing, grounded at approximately 2" directly above the edge of the cable tray.

5. Deck

6. All conduits to telecommunications wall boxes shall be a minimum one inch (1") diameter and shall be complete with protective bushings, grounding bushings, and nylon pull strings. (by Div. 26/)

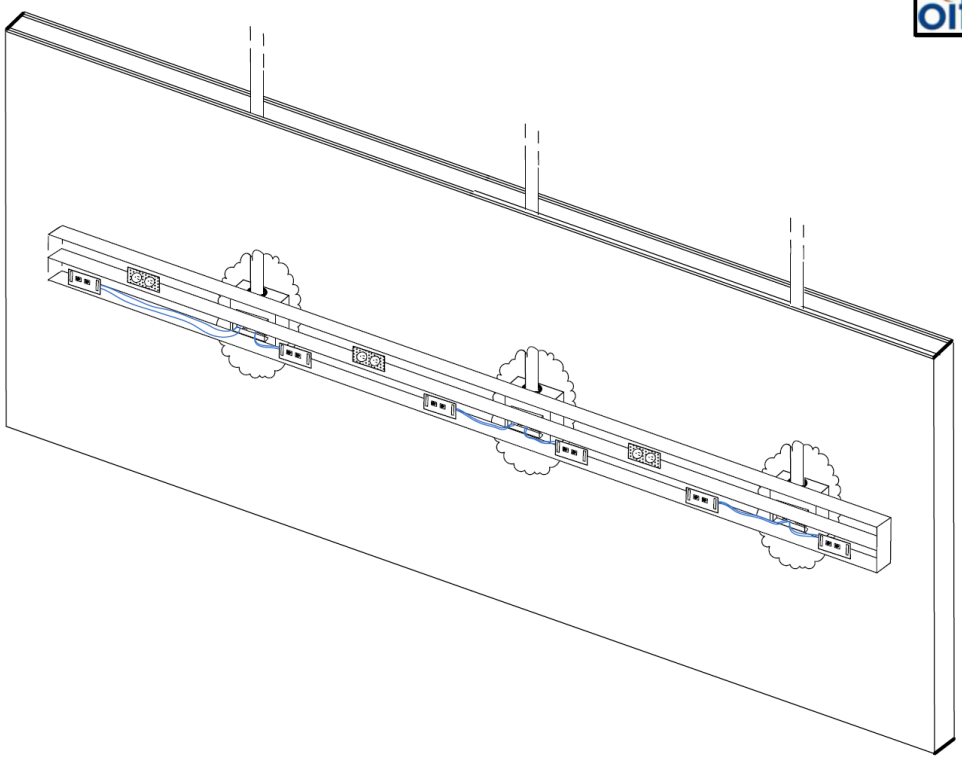
7. Wall mounted junction boxes installed for telecommunications voice and data wiring termination shall be 4 11/16" x 3 11/16" x 3" deep with single gang mud rings. (by Div. 26/)

8. Provide independently suspended J-hooks, no more than 5' apart, to support cables when existing conduits are stub-up over wall.

9. Maximum number of CAT6A cables per 1" conduit is 4

** A 3 Ft. service loop must be provided at the workstation end of the cable installation. The loop will be in the ceiling or at the cable tray.

| TITLE | Updated by: | SCALE | DATE | FILENAME | DRAWING NO. |
|---|---|---|---|---|---|
| Information Outlet Detail for CAT6A standard | J.Melendez | NTS | 10/10/2013 | OIT TELECOM.SPECIFICATIONS.APENDIX3. | 1.9 |



The Office of Information Technology
The University of Texas at San Antonio
Communications & Infrastructure Services

General Notes
Use Systimax capable "Wiremold Open System Communications Module" frame with P/N ALA-2A collar (1st choice) OR

Use Systimax "106" outlets
P/N M106FR4 (4 port)
P/N M106FR2 (2 port)
with standard duplex outlets
P/N ALA-DR, (2nd choice)

The UTSA typical aluminum SMR vendor is Wiremold
P/N ALA4800

SMR finish shall be gray unless otherwise noted

All metal raceway shall be electrically continuous and bonded in accordance with the National Electric Code for proper grounding

For more detail see Wiremold Document #: ED720R2

Maximum number of CAT6A cables per 1" conduit is 4.

Use Systimax SCS MGS500BH Information Outlets for "jacks"
*Orange jack for data
MGS500BH-112 760023564
*Ivory jack for voice
MGS500BH-246 760023606

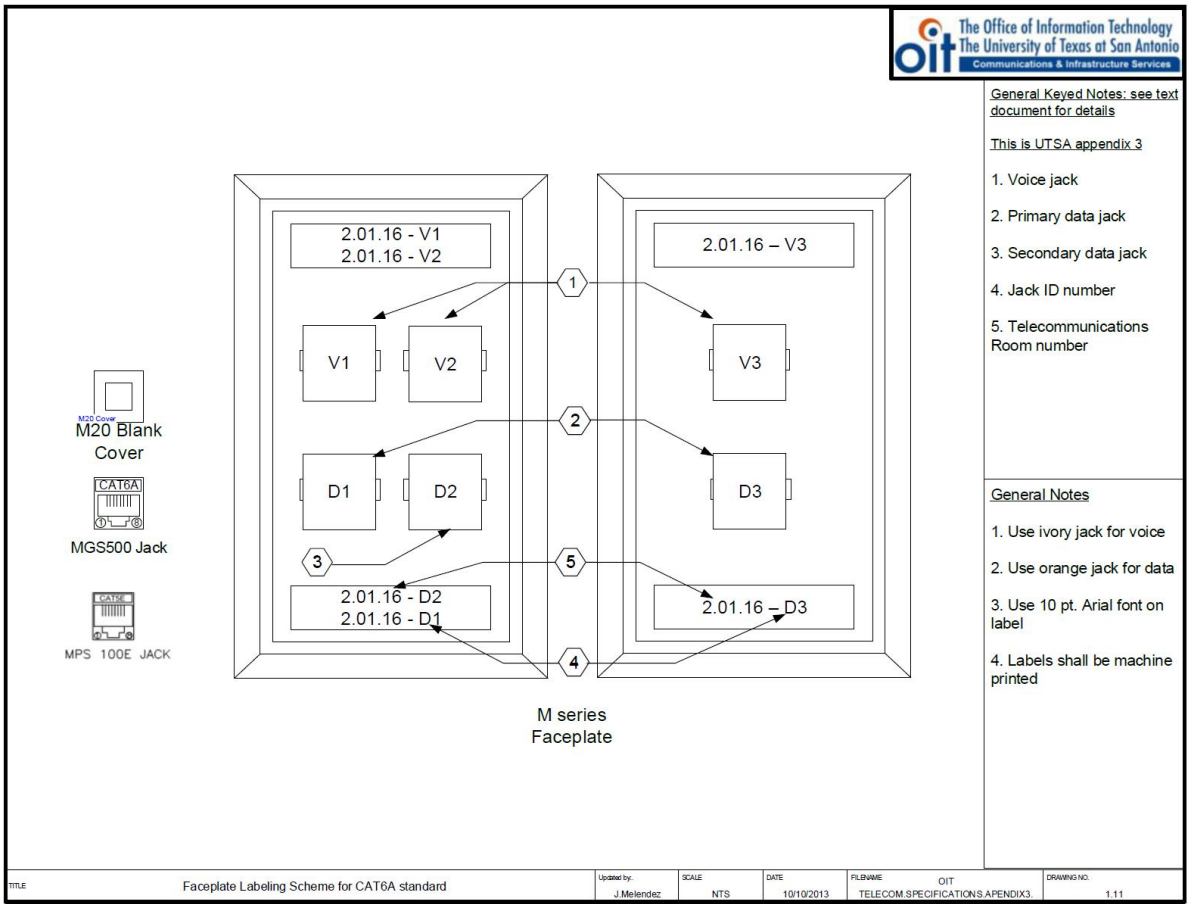
Use Systimax SCS Ivory Modular "M Series" Faceplates

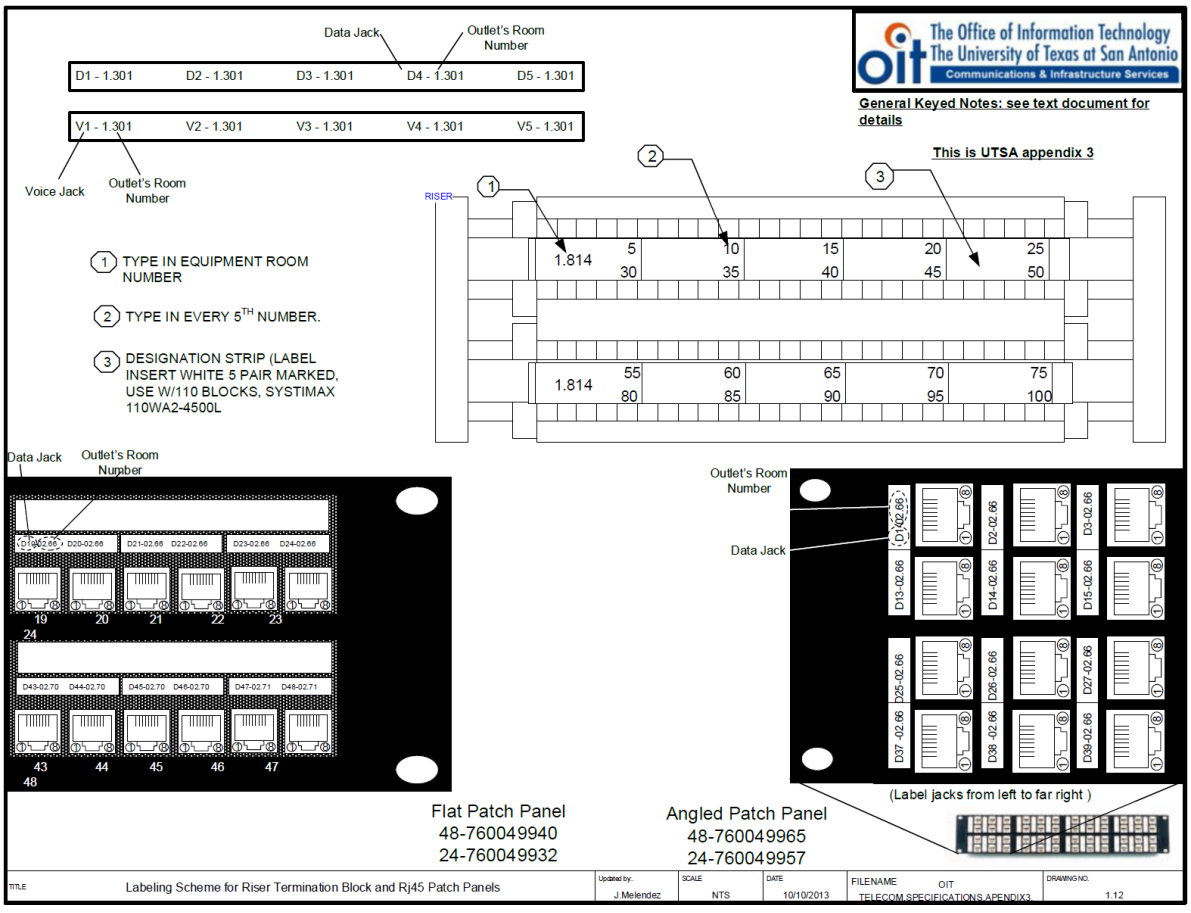
All conduit, cable tray, junction box and Wiremold work by Div. 26.

Wall mounted junction boxes installed for telecommunications voice and data wiring termination shall be 4 11/16" x 4 11/16" x 3" deep with single gang mud rings. (by Div. 26/)

** A 3 Ft. service loop must be provided at the workstation end of the cable installation. The loop will be in the ceiling.

| TITLE | Updated by: | SCALE | DATE | FILENAME | DRAWING NO. |
|---|---|---|---|---|---|
| Preferred cable layout when using Wiremold or similar wall mounted cable raceway | J.Melendez | NTS | 10/10/2013 | OIT TELECOM.SPECIFICATIONS.APENDIX3. 10- | 1.10 |




Top of Appendix | Table of Contents

*Appendix D*

# UTSAPD Security System

The following Security System Standard – although bearing a similarity to a specification section – is the most appropriate method by which to describe the requirements and operation of the UTSA campus security system. This is a **guideline** specification only, and its provisions shall be reviewed and incorporated into project plans and specifications by the design professional where and when applicable.

## 1. Scope of Standard

A. Furnish, install, program, test, and make fully operational at the locations shown, the specified equipment and all associated conductors to provide a completely operational Access Control System. Include all remote field panels, access control key-tags, access control readers/PIN pads, exit door alarm devices, power supplies, cables, conductors, and miscellaneous hardware.

1. The security system equipment shall consist of access control and detection/alarm devices controlled and monitored by a Security Management System (SMS), Emergency Assistance Stations (EAS) and Closed Circuit Television (CCTV) cameras. The CCTV cameras shall be connected to the existing CCTV system located in the Security Operation Center (SOC) via owner provided fiber optic cable.

B. **Warranty**

1. All equipment and systems shall be warranted by Contractor for a period of one year commencing with the filing date of the Notice of Completion. The Warranty shall cover all costs for warranty service, including parts, labor, prompt field service, pick-up, transportation, delivery, reinstallation, and retesting. A contract for service shall cover the period starting with the first expected activation of each system and shall continue without interruption to cover the period to the end of the one year warranty as defined above. The end of the warranty period shall be handled such that a smooth transition to a maintenance agreement with the Owner can be achieved with no lapse in coverage.

C. **Training**

1. Provide instruction, as determined by Owner, for up to eight persons of Owner's designated staff on operation and maintenance of system. Review the typed operating instructions. Operations manuals shall be complete and used for instruction. Provide one copy of operations manual to each trainee, supplement with training material as required. Demonstrate all applicable system functions and features.

## 2. Products

A. **Acceptable Manufacturer**:

*DSX Access Systems, Inc.*
*10731 Rockwall Road*
*Dallas, Texas 75238*

*(214) 553-6140 voice*
*(214) 553-6147 facsimile*
*(800) 346-5288 voice*

B. **Work Included:**

1. All materials listed in these Standards and on the Drawings, shall be provided by the Contractor unless specifically excluded or modified in other portions of this Specification or Addendums.
2. The Contractor shall provide and install the access control devices, intrusion detection/alarm devices and data gathering panels (DGPs), as specified herein, and as indicated on the drawings. The Contractor shall terminate all wiring, provided by the others, and connect to the existing SMS. Provide all hardware and software expansion required for the SMS to support the scheduled devices.
3. Interface the Security Telephones' auxiliary output contacts to the SMS for future alarm camera call-up at the existing CCTV system head-end equipment.
4. Provide DGPs, as necessary in the telecommunication rooms identified in the design and specifications.
5. Provide card reader control of the elevators as identified in the design and specifications.
6. Interface to the elevator duress button contacts, provided by the elevator contractor, for monitoring by the SMS. The elevator duress button contacts shall be located in the elevator machine rooms.

C. **Materials**

1. Security Management System (SMS): The SMS Software shall provide the following functions:
    a. Access control
    b. Security:
        i. Point Monitoring
        ii. Elevator Control
        iii. Photo ID Badging
        iv. Guard Tour
        v. Time and Attendance
        vi. Key Tracking
        vii. Image Recall with Historic and User Accountability Reporting
        viii. Live CCTV display/control
        ix. Interface with Paging, CCTV, Parking, Central Station, Automated Alarm Systems, HVAC, and Elevator Control Systems
        x. Digital Video Recorder Integration
2. SMS Overview
    a. PC based: The system is a PC based Building/Facility Management and Monitoring System used to control and monitor personnel and alarm activity. The DSX system

provides 5 different controllers that offer various configurations of card reader inputs, relay outputs and alarm inputs. These controllers can be combined to provide the exact number of inputs and outputs required for each application. DSX controllers use fully distributed database architecture with real-time processing performed at each controller.

b. Distributed Processing: This fully distributed processing provides that all information (time, date, valid codes, access levels, etc) is downloaded to the controllers so that each controller makes its own access control decisions. There are no hierarchical or intermediate processors to make decisions for the controllers. Also the PC is not required to make any decisions for the controllers including any global functions. This provides Instant response to card reads regardless of system size. This also provides for no degradation of system performance in the event of communication loss to the host (or actual loss of host). All time zones, access levels, linking events, holiday schedules, and global functions remain operational. Upon communication loss to the host all controllers shall automatically buffer event transactions until the host communications is restored, at which time the buffered events will be automatically uploaded to the host. The system maintains full feature capability regardless of the style of the communications from the PC. This means that DSX dial-up modem sites can utilize all standard features like elevator control and linking between controllers without the PC needing to be online.

c. System Size: The system is designed to support up to 32,000 separate locations using a single PC with combinations of direct connect, dial-up or TCP/IP LAN connections to each location. DSX defines a loop of up to 64 controllers as one location. Each location has its own database and history at the host PC. Locations may be combined to share a common database and create a very large network of controllers. Each location can have up to 128 readers.

d. Intelligent Controllers: Each DSX controller is an Intelligent Control Unit. The first controller of every location is designated as the "Master". All subsequent controllers at the same location are designated as "Slaves". Any DSX controller may be selected by dipswitch settings to work as the Master controller. The Master controller performs all the same functions as a Slave controller, but it is also responsible for polling all Slave controllers and communicating with the host PC. The Master controller does not make any access decisions for the Slave controllers. It is simply the messenger for information from the controllers to the PC and for information from the PC to the controllers.

e. Controller operating system resides in Flash ROM on each controller. It is upgradeable thru a download from the Host PC to each of the 1040 series and 1022 controllers in the system. Upgrades in controller operating system shall NOT require

PROM changes.

f. Processing Power: Each intelligent controller uses an Intel microprocessor (same as a PC) as its engine. In a large system, the total processing may approach, or even exceed that of a Mini Computer. Instead of all the processing power being centralized in one "Mini" it is distributed throughout the system.

3. SMS Requirements
   a. Software Requirements:
      i. Based on 32-bit Windows NT application, and compatible with Windows NT 4.0 service pack 6 Workstation, Windows 2000/XP Professional.
      ii. Multi-user and multi-tasking capability allowing for independent activities and monitoring to occur simultaneously at different workstations.
      iii. Utilize graphical user interface with simple pull-down menus and a menu tree format that conform to interface guidelines defined by Microsoft Corporation.
      iv. Allow for language localization.
      v. Allow LAN/WAN network applications, using TCP/IP protocol, with up to 99 work stations.
      vi. System shall be site licensed, not seat licensed.
      vii. System shall have open architecture that allows importing and exporting of data and ability to interface with other systems.
      viii. Operator Identification logon password protected.
   b. Hardware Requirements:
      i. Server PC: Windows NT 4.0 service pack 6, Windows 2000/XP capable PC with an 850 MHz Pentium processor or greater, with 256MB RAM.
      ii. Workstation PC: Windows NT 4.0 service pack 6, Windows 2000/XP capable PC with a 650 MHz Pentium processor or greater, with 128MB RAM.
      iii. Other requirements as indicated herein.

4. Server or Workstation Configuration: 100% IBM compatible PC approved by Microsoft Corporation for running the Microsoft Windows NT 4 or Windows 2000/XP Professional operating system, and having the following minimum requirements:
   a. Processors:
      i. Pentium 650 MHz (minimum) for use as host PC, with 128 MB RAM for a single location.
      ii. Pentium 850 MHz (minimum) for LAN Comm Server or file server, with 256 MB RAM, minimum for single location.
      iii. Pentium 1GHz LAN Comm Server and/or combination file server with 512 MB RAM, minimum for multiple location system.
   b. Operating System: Windows NT 4 or later, with Service Pack 6a, or Windows 2000/XP Professional.
   c. Hard Disk: 1 Gigabyte free space.
   d. Drives:

i. 3.5-inch- floppy drive
ii. 6x CD-Rom drive or higher.

e. Sound Card: Windows and Sound Blaster compatible; required for sound operations; not required for system operation.

f. Super VGA monitor, 800 x 600 pixels minimum resolution; 17 inch recommended.

g. Backup Device: Tape, Zip or CD-Rom recommended but not required for system operation.

h. Peripherals:
   i. Serial Ports: Minimum of 1 for either direct or dial-up modem communications.
   ii. Mouse: Microsoft IntelliMouse or equivalent recommended but not required.
   ii. Modem: DSX provided external dial-up modem only.

i. LAN:
   i. Adapter Card: Required for LAN applications only. 100Mbit is optimum.
   ii. If no LAN is required, an MS-Loop back Adapter (provided by Windows NT and Windows 2000/XP) shall be used.

j. Printer: All Windows NT, Windows 2000/XP supported printers; required for transaction hard copy; not required for system operation

5. Software: WinDSX Software, complete with the following features and functions:

   a. 32-bit access control and alarm monitoring system that conforms to the programming and interface guidelines defined by Microsoft Corporation for Windows NT 4.0 Service pack 6 or Windows 2000/XP Professional compatible software

   b. Basic Functions:
      i. Access Control.
      ii. Activity Monitoring.
      iii. Database Management.
      iv. Database Reporting.
      v. Point status and overrides.

   c. System Capacities:
      i. Support a minimum of 32,000 locations having grouping capabilities to share cardholder databases between sites.
      ii. Support a minimum of 4,096,000 readers or 128 reader-controlled doors per location.
      iii. Support a minimum of 170 different card reader formats
      iv. Support 1.6-billion cardholders total or up to 50,000 access codes/cards per location.
      v. Support a minimum of 32,000 supervised alarm inputs or a minimum of 2048 per location.
      vi. Support a minimum of 32,000 programmable outputs or a minimum of 2048 per location.
      vii. Support up to 32,000 facility codes (site codes) total or a minimum of 2048 per location.

viii. Support a minimum of 32,000 time zones or a minimum of 2048 per location with each time zone having 3 holiday overrides
ix. Support a minimum of 32,000 companies/card holder groups.
x. Support a minimum of 32,000 self-purging/auto-renewing holidays.
xi. Support a minimum of 99 user defined date fields per location.
xii. Support a minimum of 32,000 system operators.
xiii. Support a minimum of 32,000 password profiles to determine accessibility of system for each operator.
xiv. Support a minimum of 999 operator comments.
xv. Support a minimum of 32,000 graphic alarm maps for full input, output, CCTV control, DVR control, and alarm handing.
xvi. Support a minimum import of 21 graphic file types for maps.
xvii. Support a minimum of 32,000 custom action messages per location to instruct operator on action required when alarm is received.
xviii. Support a minimum of 32,000 ASCII output messages per location for use to interface with CCTV and pager systems.
xix. Support a minimum of 32,000 input-to-output links.
xx. Support a minimum of 32,000 code-to-output links.
xxi. Support a minimum of 999 guard tours.
xxii. Each controlled entry/exit shall have the ability to be locked (secured) and unlocked (open) up to 4 times a day through time zone programming.
xxiii. Each monitored input shall have the ability to be armed and disarmed up to 4 times a day through time zone programming.
xxiv. Each reader/keypad shall have the ability to be enabled/disabled up to 2 times a day through time zone programming.
xxv. Each card/code shall have the ability to be enabled/disabled up to 4 times per day per entry point through access level programming.
xxvi. Provide for support up to 9999 cameras displayed per workstation with live video and Pan, Tilt, Zoom, Scan and Auxiliary controls in video window.
xxvii. Support a minimum of 32,000 Access Levels.
xxviii. Support a minimum of 4 Anti-passback zones per location.

d. Basic System Features: These features are considered to be standard without the need for any add-on software or hardware.
i. Shall have up to 99 Workstations with one site license.
ii. Each workstation shall have access to all features if password level allows. In addition if workstation is used

for other tasks (applications) system has option of having an Alarm Pop-up window appear to alert of pending alarms while the operator is using some other program.

iii. Password levels shall be individually customized to allow or disallow operator access to any program function for each location.

iv. Workstation Event Filtering: Shall allow user to define events and alarms that will be displayed at each workstation. Each workstation shall be able to define and assign time zone controlled filters. In addition if an alarm is unacknowledged (not handled by another workstation) for a preset amount of time the alarm will automatically appear on the filtered workstation.

v. CCTV Alarm Interface: Shall allow commands to be sent to CCTV systems during alarms (or input change of state) thru serial ports.

vi. Animated Response Graphics: Provide for highlighting Alarms with flashing Icons on graphic maps. The current status of alarm inputs and outputs shall be displayed and constantly updated to display changes in real time through animated Icons.

vii. Provide the ability to view and control cameras from the graphic maps.

viii. Multimedia Alarm Annunciation: Provide for WAV files to be associated with alarm events for audio annunciation or instructions.

ix. Alarm Handling: Each input may be configured so that an alarm cannot be cleared unless it has returned to normal, and/or option of requiring the operator to enter a comment about disposition of alarm.

x. Provide 99 User Defined Fields for cardholder data. System shall have the ability to run searches and reports off of any combination of these fields. Each UDF can be configured with any combination of the following features. MASK: Determines a specific format that data must comply with. REQUIRED: Operator is required to enter data into field before saving. UNIQUE: Data entered must be unique. DE-ACTIVATE DATE: Data enter will be evaluated as an additional deactivate date for all cards assigned to this cardholder. NAME ID: Data entered will be considered a unique id for the cardholder. AUTO INCREMENTING CARD NUMBER: Badge serial number that prompts the operator to increment the number each time the badge is printed.

xi. Time and Attendance reporting shall be provided to match in/out reads and display cumulative time in for each day and cumulative time in for length of the report.

xii. Guard Tour: Shall provide ability to Plan, Track and

Route tours. Shall produce alarm during tour if guard fails to make a station. Tours can be programmed for sequential or random tour station order.

xiii. Pager System Interface: Alarms shall be able to activate a pager system with customized message for each input alarm.

xiv. Floor Select Elevator Control and Reporting: Provide for any Card read to activate any floor from the appropriate Cab and report what floor was selected by which cardholder.

xv. After Hours HVAC control: Provide for any Card read to activate or control individual HVAC zones based on access and linking level.

xvi. A means for importing of custom Icons for representation of Inputs, Outputs, or Cameras shall be provided.

xvii. Photo ID Badging: Provide ability to import images from bitmap file formats, digital cameras, TWAIN cameras, scanners, or live video. Allows image cropping and editing, WYSIWYG badge building application, and full badge printing/print preview capabilities.

xviii. Photo Recall on Card Use: Provide means that Images can be automatically displayed on a workstation in response to any card read on any reader, as dictated by Time zone per card reader.

xix. Photo Recall on Event Selection: Provide means that Images can be manually displayed on a workstation by clicking on the Access Granted or Denied event.

xx. Four Zones of Global Anti-Passback: Provide four separate zones per location that can operate without requiring interaction with the host PC (done at controller level). In addition each anti-passback reader can be further designated as Hard, Soft or Timed in each of the four anti-passback zones.

xxi. Global IO Linking: Provide that any Input or Output can link to any other Input or Output within the same location without requiring interaction with the host PC (done at controller level).

xxii. Global Code to IO linking: Provide that any access granted event can link to any input or output with the same location without requiring interaction with the host PC (done at controller level).

xxiii. Alarm Automation Interface (Smart Port): Provide High level interface to central station alarm automation software systems. Allows input alarms to be passed to and handled by automation systems in the same manner as burglar alarms, using an RS-232 ASCII interface.

xxiv. Alarm Echo Offsite Monitoring: Provide ability of access control system at a central site to provide after hours monitoring of other proprietary Like Same access control system(s) using dial-up modems.

xxv. Remote Control/Diagnostics: Provide ability of access control system at central site for operator to call the host PC at a Like Same proprietary access control site and control inputs, outputs, and card readers without performing a download or affecting the downloaded data.

xxvi. Visitor Management: Provide for and allow an operator to be restricted to only working with visitors. Shall have ability to enroll codes for visitors and can only assign access levels that have designated as approved for visitors. Provides for an automated Logbook of, visitor name, date and whom visitor contacted.

xxvii. Reports: Provide for but not be limited to:

- Custom History Report Generation: Reports shall be tailored to exact requirements of who, what, when, where, and report parameters shall be stored for future recreation of report.
- Custom History Reports can be previewed, printed to local or network printer or saved to file.
- Automatic History Report Generator: Provides history reports to be named, saved, and scheduled for automatic generation, printing and/or emailed.
- Card Holder Reports shall have options to include complete cardholder data or selected parts as well as ability to be sorted by Name, Card Number, Imprinted Number or by User Defined Fields.
- Card Holder By Reader Reports: Provide ability to run Card Holder reports based on who has access to a specific reader or group of readers by selecting the readers from a list.
- Card Holder By Access Level Reports: Provide ability to run Card Holder reports that display everyone that has been assigned to the specified access level.
- Card Holder by Output Linking Level Reports: Provide ability to run Card Holder reports that display everyone that has been assigned to the specified Output linking level.
- Card Holder Photo Roster Report: Provide the ability to print from 1 to 50 card holder pictures per page along with any other card holder data as required.
- Emergency "Who is IN" report (or Muster report): Provide for one Click operation on tool bar to launch report. "Who is IN" must also have ability to be initiated by alarm defined separately by workstation. Input alarm can be any input on any controller.

- Management reports to include but not be limited to, Number of Card Holders currently on site, In's and Outs, Activity Summary sorted by Company, Daily Activity, and Number of Card Holders currently Not on site
- Number of Uses: Provides total number of uses at specified reader. This report is useful for the billing of after hours HVAC use. Report must have option to be sorted by Cardholder or by Company.
- Panel Labels report. Provide ability to print out the control panel field documentation including the actual location of equipment, programming parameters, and wiring identification. The system shall be capable of maintaining system installation data within the system database so that it is available on site at all times.
- Scheduled Override Report: Allows for a report of Scheduled Overrides programmed in the Workstation screen.
- Activity/Alarm On Line Printing: Provide activity printers to be used at any workstation, printing all events or just alarms.

xxviii. Key control Software: Provide ability to store what (conventional metal) keys are issued and to whom, along with key construction information. Reports can be generated to list everyone that has possession of a specified key. Key assignments can be included in Card Holder Reports.

xxix. All messages from PC to controllers and controllers to controllers shall be on a polled network that utilizes check summing and acknowledgement of each message. All communication shall be verified and will automatically be buffered and retransmitted if the message is not acknowledged.

xxx. TCP/IP Host PC to Controller Communications: Host PC provides for communications to be redirected through a LAN/WAN to a TCP/IP address, rather than through a conventional serial port connection.

xxxi. Regional Time Zone Settings: Provide for the adjustment of Time Zone references for both Workstation PC's and sets of controllers based on their physical locale.

xxxii. Selectable Poll Frequency and Message Time Out settings: Provide means to deal with bandwidth and latency issues for TCP/IP, RF and other PC to Controller communications methods by changing the polling frequency and the amount of time the system waits for a response.

xxxiii. Scheduled Override of individual Input and Outputs. Provide the ability to schedule temporary future date

overrides to Arm or Bypass inputs, and Secure or Open Outputs. A scheduled override shall consist of a start time/date and an action to perform coupled with a stop time/date and action to perform.

xxxiv. Override Groups: Provide Groups (or sets) of inputs and outputs that can be monitored and controlled through one Icon. A summary Icon shall be used to display status of all items in the override group. Override group Icons may be placed on graphic maps and may have Scheduled Overrides applied.

xxxv. Automatic and Encrypted Backups: Provide for database and history back-ups to be automatically stored (anywhere on network) and encrypted with a 9 character alpha-numeric password which must be used to restore or read data contained in the back-up. Shall provide ability to set the number of automatic sequential back-ups before the oldest backup becomes overwritten, (FIFO mode).

xxxvi. Operator Audit Trail: Provide for recording and reporting of all changes made to the database. This option shall have the ability to be toggled off.

xxxvii. Copy command in database: Provide for like data to copied and then edited for specific requirements, (eliminates redundant data entry).

xxxviii. Inputs, outputs, and maps shall have a display order assigned that determine the order shown under status and over-ride windows.

xxxix. Cardholder: Provide for but not limited to the following;

- Shall have the ability to create multi-location access levels combined with the ability to assign an unlimited number of access levels to a card. Each access level may include any combination of doors from any location. Each door within the access level may have 4 time zones associated with it.
- Temporary Access Levels: Provide temporary access levels to be assigned to a card using user defined start and stop dates.
- Shall have Name search engine with capabilities such as, can search by Last name, First name, Company, User defined data, Codes not used in "X" days, Skills or by 7 other methods. Shall have ability In Workstation to display anti-passback status to quickly verify if user is in facility.
- Multiple De-Activate Dates for Cards: Provide user defined fields to be configured as additional Stop Dates to deactivate any cards assigned to the card holder.
- Data Base program shall have Active/De-

activate buttons in the tool bar that can quickly change users' status. Simultaneous multiple selections is an option.
- Batch card printing shall be provided as standard.
- Default Card data can be programmed to speed data entry for sites where most card data will is similar.
- Enhanced ACSII File Import Utility shall be provided to allow the importing of cardholder data and images.
- Provide a Cards Expire when used at this reader option that allows readers to be configured to deactivate cards when a card is used at that device. Typically used at Visitor badge return.

xl. Shall automatically define an Output (reader controlled output relay) and Input (door position switch) with the name of the card reader each time a card reader is added to the system to speed data entry.

xli. Re-Occurring Holiday Schedules: Provide option for holidays to be set to re-occur each year, preventing holiday from being purged from system once the date passes.

xlii. The date time shall be displayed and printed in the format that matches that of the host PC, referred to as windows short date format.

6. **Hardware**

a. Starter/Update Kit

i. WinStart SQL: Consists of one copy of the WinDSX SQL software on CD, one copy of the Tech Binder that contains a minimum of 1each of the software installation manual, hardware installation manual, design guide (or product catalog), and two separately bound copies of the User Manual. Provide in version [Current Production release (default)] [or specific Previous to Current release].

b. Intelligent Controller:

i. Model DSX-1048PKG Intelligent 8 Door I/O Controller:
- Designed for eight-door reader/key pad application.
- Inputs: 32 EOL supervised inputs
  - Each capable of 2, 3, or 4 state point monitoring with trouble reports.
- Outputs: 8 relay, 8-Open collector outputs, 8 pre-warn, 24 LED drivers as follows:
  - 8 - Form C, 5 amp rated relay outputs.
  - 8 - Open collector outputs 100ma
  - 8 - Pre-warn outputs for door being held open sounders.
  - 24 - LED output Drivers to show lock

status and or valid card read status at the reader or keypad.

- Basic Features:
  - UL 294
  - Complete distributed processing: No reliance on host PC for any decision-making.
  - Access verifications for all cards performed at controller.
  - Linking: Input to Input, Input to Output, Output to Input, Output to Output, Code to Input and Code to Output Linking. Done locally at controller AND/OR controller to controller.
  - Status LED for each Input
  - Status LED for each Output
  - Controller Polled LED.
  - Separate communication receive and transmit LEDs.
  - Processor functioning properly LED.
  - Dynamic Battery load test: Programmable using a spare open collector output to trip the Battery Test Input. Battery test may also be manually initiated thru PC at any time.
  - Battery Load shed circuit: Once the system is running on battery power the batteries must be disconnected at approximately 9VDC. The batteries must stay disconnected until AC power is restored.
  - Controller must report to PC loss of power and low battery as separate alarms.
  - Status LED for DC power to Controller.
  - Real time on board clock/calendar generation that is synchronized with host PC clock/calendar.
  - Dynamic memory allocation.
  - Change to/from auto buffering of all transactions based on communications status.
  - Point to point RS-485 4 wire controller communications allowing up to 4000 feet between each 1048PKG.
  - Wiring Management System that includes wire chases, cable ties and mounting clips.
  - Silkscreen detailing displays wiring

termination and function of all terminals on controller.
    - Controller operating system resides in Flash ROM that is upgradeable thru the Host PC. Upgrades in controller operating system shall NOT require PROM changes.
- Power Supplies: DSX-1040PDP (power distribution panel) and DSX- 1040CDM (communications distribution module), Included in 1048PKG
    - 10-15VDC, 12VDC nominal / 8A power for controllers. (Battery backed up).
    - 8-12VDC 8.5A / 24VDC 4.25A power for locks (optional battery backup).
    - 5VDC .375 amp for 5 volt devices.
    - UL294
    - AC loss and low battery supervisory outputs.
    - Battery load test control input.
    - Lock power override input.
    - Provides individual fused output for 8 locks.
    - Provides for 8 individual sets of termination of Lock wiring and control relay wiring. On removable terminals.
- Controller Architecture:
    - AM186 20 MHz processor, RAM, ROM, and removable field wiring terminals.
- Compatibility:
    - Controller is compatible with any identification device that transmits data using Wiegand, clock/data, or RS-232 ACSII at 1200 baud 8N1. This includes but is not limited to proximity, barium ferrite, bar code, magnetic stripe, Wiegand, keypads, and biometric readers.
- Memory:
    - RAM: 512K
    - ROM: 512K Flash
- Communications:
    - Via direct serial port, dial-up modem, or TCP/IP. TCP/IP communications require additional hardware.
    - Communication Ports: PC to controller 1 - RS-232 in; 50 feet max. 50ft – 4000 feet requires two MCI modules.
    - Controller to controller in the same

enclosures; RS232 via the 1040CDM. 1048 to 1048 regenerative RS485 4000 feet max via the 1040CDM to other enclosures.
- 1040CDM (communications distribution module) handles RS232 between controllers in the same enclosure, and serves as RS485 connection point for other 1040 series PKG units or 1022 controllers in controller network.

- Physical Specifications:
  - Cabinet: DSX-1040E 15.5 inches wide x 22.5 inches tall x 6 inches deep, key locale. Total Weight: 25.0 lbs.
  - Cabinet: DSX-1040PE 15.5 inches wide x 14 inches tall x 6 Inches deep, key locale. Total Weight: 25.0 lbs.
  - Cabinet Finish: Black powder coat with white silkscreen.
  - Operating Temperature: 32 to 131 degrees F.
  - Operating Humidity: 0-95% RD
  - Battery Changing Output:
    - Trickle Charge: 13.5 VDC. 500ma, fused.
    - Standby Time: 11 hours under minimum load and 3.25 hours under maximum load w/ 2-12VDC 7AH battery.

ii. Model DSX-1042PKG Intelligent 2 Door I/O Controller:
- Designed for two-door reader/key pad with future growth capabilities to 8 reader application. May add individual 1042, 1043 or 1044 controllers for additional capacity of Readers, Relays or Inputs.
- Inputs: 8 EOL supervised inputs
  - Each capable of 2, 3, or 4 state point monitoring with trouble reports.
- Outputs: 2 relay, 2-Open collector outputs, 2 pre-warn, 6 LED drivers, as follows:
  - 2 - Form C, 5 amp rated relay outputs.
  - 2 - Open collector outputs 100ma
  - 2 - Pre-warn outputs for door being held open sounders.
  - 6 - LED output Drivers to show lock status and or valid card read status at the reader or keypad.
- Basic Features:
  - UL 294

- Complete distributed processing: Never any reliance on host PC for any decision making.
- Access verifications for all cards performed at controller.
- Linking: Input to Input, Input to Output, Output to Input, Output to Output, Code to Input and Code to Output Linking. Done locally at controller AND/OR controller to controller.
- Status LED for each Input.
- Status LED for each Output.
- Controller Polled LED.
- Separate communication received and transmitted LEDs.
- Processor functioning properly LED.
- Dynamic Battery load test: Programmable using a spare output to trip the Battery Test Input. Battery test may also be manually initiated thru PC at any time.
- Battery Load shed circuit.
- Controller can report to PC a loss of DC power, and low battery as separate alarms.
- Status LED for DC power to Controller.
- Real time on board clock/calendar generation that is synchronized with host PC clock/calendar.
- Dynamic memory allocation.
- Change to/from auto buffering of all transactions based on communications status.
- Point to point RS-485 4 wire controller communications allowing up to 4000 feet between each 1042PKG.
- Wiring Management System that includes wire chases, cable ties and mounting clips.
- Silkscreen detailing displays wiring termination and function of all terminals on controller.
- Controller operating system resides in Flash ROM that is upgradeable thru the Host PC. Upgrades in controller operating system shall NOT require PROM changes.

- Power Supplies: DSX-1040PDP (power distribution panel) and DSX- 1040CDM

(communications distribution module), Included in 1042PKG
    - 10-15VDC, 12VDC nominal / 8A power for controllers. (Battery backed up).
    - 8-12VDC 8.5A / 24VDC 4.25A power for locks (optional battery backup).
    - 5VDC .375 amp for 5 volt devices. 3)
    - UL294
    - AC loss and low battery supervisory outputs.
    - Battery load test control input.
    - Lock power override input.
    - Provides individual fused output for 8 locks.
    - Provides for 8 individual sets of termination of Lock wiring and control relay wiring with removable terminals.
- Controller Architecture:
    - AM186 20 MHz processor, RAM, ROM, and removable field wiring terminals.
- Compatibility:
    - Controller is compatible with any identification device that transmits data using Wiegand, clock/data, or RS-232 ACSII at 1200-baud, 8N1. This includes but is not limited to proximity, barium ferrite, bar code, magnetic stripe, Wiegand, keypads, and biometric readers.
- Memory:
    - RAM: 512K
    - ROM: 512K Flash
- Communications:
    - Via direct serial port, dial-up modem, or TCP/IP. TCP/IP communications require additional hardware.
    - Communication Ports: PC to controller 1 - RS-232 in; 50 feet max. 50ft – 4000 feet requires two MCI modules.
    - Controller to controller in the same enclosure; RS232 via the 1040CDM. 1042 PKG to 1048 PKG to 1022 regenerative RS485 4000 feet max via the 1040CDM.
    - 1040CDM (communications distribution module) handles RS232 between controllers in the same enclosure, and serves as RS485 connection point for other 1040 series

PKG units or 1022 controllers in controller network.

- Physical Specifications:
  - Cabinet: DSX-1040E 15.5 inches wide x 22.5 inches tall x 6 inches deep, key locale. Total Weight: 25.0 lbs.
  - Cabinet: DSX-1040PE 15.5 inches wide x 14 inches tall x 6 Inches deep, key locale. Total Weight: 25.0 lbs.
  - Cabinet Finish: Black powder coat with white silkscreen.
  - Operating Temperature: 32 to 131 degrees F.
  - Operating Humidity: 0-95% RD
  - Battery Changing Output:
    - Trickle Charge: 13.5 VDC. 500ma, fused.
    - Standby Time: 11 hours under minimum load and 3.25 hours under maximum load w/ 2-12VDC 7AH battery.

c. Master Communication Interface:
   i. Model DSX-MCI Single Channel RS-232 to RS-485 Converter:
      - Extends data communications between the PC and Master controller beyond the 50 feet limit of RS-232.
      - Can be used as an RS-232 to RS-485 converter.
      - Contains two communications LED's to reflect the status of transmit and receive data terminals.
      - Contains voltage regulator to step 12VDC to 9VDC for Modem use at dial-up sites.

d. Quadraplexor:
   i. Model DSX-1035 Quadraplexor Communications Multiplexer:
      - Multi-function, protocol independent communications repeater hub.
      - Accepts one RS-232 or RS-485 signal input and supplies one RS-232 signal output and four RS-485 signal outputs.
      - Complete with built-in power supply.
      - Use of device allows branch (star configuration) wiring.

e. Single Channel MUX Repeater:
   i. Model DSX-485T two Channel RS-485 Mux/Repeater: Two channel repeater, intended for applications where a DSX controller is being added to an existing system containing non-revised (prior to 1993) 1032 and 1033 controllers.

f. Multiple RS-232 Output Module:
   i. Model DSX-232MUX, RS-232 Communications Mux:

- Provides 6, RS-232 serial outputs from either an RS-232 or RS-485 input.
- Purpose: Connects up to 6 Slave controllers from remote sites to a common Master in a centralized location.

g. Open collector Output converter:
   i. DSX-FR8B 8 From C relay outputs:
      - Converts 8 open collector outputs to Form C relays rated at 5 amps.
      - Fuse in series with each common of each relay to protect relay and lock power supply.
      - Connects to 1048PKG or 1042PKG.
      - LED for each relay to show activation.

h. Reader Interface:
   i. Model DSX-CKI-C Cardkey Card Reader Interface:
      - Allows Cardkey, Wiegand or Magstripe readers to be connected to system, converts one wire data in to two wire data.
      - One module required for every two readers connected.
      - Model DSX-CKI-K Cardkey Card Reader plus Keypad Interface:
      - Allows combination Cardkey, Wiegand/Keypad readers or Cardkey, Magstripe Reader/Keypad readers to be connected to system, converts one wire data in to two wire data.
      - One module required for every two readers connected.
   ii. Model DSX-PCI Reader Interface:
      - Provides interface between existing PCSC, Barrium Ferrite Swipe and Insert readers and controller.
      - Supports 2 PCSC swipe or insert readers.
      - One module required for every two readers connected.
   iii. Model DSX-CPI Reader Interface:
      - Provides interface between existing CheckPoint proximity readers and controller.
      - Supports 1 Checkpoint reader.
      - One module required for each reader connected.
   iv. Model DSX-WMI Reader Interface:
      - Provides interface between existing WaterMark readers and controller.
      - Supports 2 WaterMark readers.
      - One module required for every two readers connected.
   v. Model DSX-RKM Reader Interface:
      - Provides interface between existing Radionics ReadyKey proximity readers and controller.
      - Supports 2 readers.

- One module required for every two readers connected.

vi. Model DSX-AMI Reader Interface:
- Provides interface between existing American Magnetics magnetic stripe readers and controller.
- Supports 1 reader.
- One module required for each reader connected.

i. Time Display Module Model DSX-TDM:
i. 4 digit LED time display Module.
ii. Housing: Black aluminum.
iii. Display Height: 1 inch.
iv. Synchronization: Once each minute.

j. Card Reader Cable Noise Filter Model DSX-220:
i. Designed for use in harsh environments where RF or electrical noise is induced on the cable.
ii. Serves as a data line extender for service up to 1500 feet from controller.
iii. Two piece device, one each installed at controller and the other at the reader, (requires 12vdc power at each device).

k. Data Protection Module:
i. Provided with 3-stage surge protection, one module required at each end of communication line.
ii. Model DSX-DP485, RS485 Data Surge Protection Module.
ii. Model DSX-DP232, RS232 Date Surge Protection Module.

l. Additional Controller Enclosure(s): DSX-1040E.
i. Six Slot Equipment Enclosures with Lock and Key. Accepts 4 1040 series controllers, one 1040CDM and one expansion slot.
ii. Provided complete with wire channels, conduit knockouts, and wire tie anchors.
iii. Constructed of 18-gage powder coated steel, black color, with white silk-screened cabinet identifications.
iv. Depth: 6 inches deep.
- Face dimensions: 15.75 inches wide x 22.75 inches tall

7. **System Operation and Control Specifications**

a. System Integrity and Performance
i. Each controller shall operate as an autonomous intelligent processing unit. It shall be part of a fully distributed processing control network. Each controller shall maintain its own database, in its entirety, necessary for independent operation in its own RAM. It shall make all decisions about access control, alarm monitoring, linking functions and door locking schedules for its operation independent of any other system components.

ii. When controller is brought on-line all database parameters shall be automatically downloaded to it. After initial download is completed only database changes shall be downloaded to each controller. This shall be referred to as "Incremental downloads" or "Downloading of Changes Only".

iii. I/O Linking and Anti-passback functions shall operate globally between all controllers within the same location without any Host PC intervention. Linking and Anti-passback functions shall not depend on any decision-making process or macros from the Host PC and shall occur even with the Host PC off line.

iv. Controller operating system resides in Flash ROM that is upgradeable thru a download from the Host PC. Upgrades in controller operating system shall NOT require PROM changes.

v. A location shall be defined as a loop of up to 64 controllers (128 readers).

vi. The first controller of every location shall be designated as the "Master". All subsequent controllers at the same location shall be designated as "Slaves". Any controller may be selected by dipswitch settings to work as a Master controller. A Master controller shall perform all the same functions as a Slave controller, but it shall also be responsible for polling all Slave controllers and reporting the history transactions to the host PC. The Master controller shall not make any access decisions for the Slave controllers. The Master controller shall be the messenger for information from the controllers to the PC, and from the PC to the controllers.

vii. Each card reader port of a controller shall be custom configurable for over 120 different card reader or keypad formats. Multiple card reader/keypad formats may be used simultaneously at different controllers and even within the same controller.

viii. The Controller shall provide a response to all Card Read or Keypad entries in less than .25 seconds regardless of System size.

ix. All valid codes for a location shall be downloaded and reside in the controllers. The controllers shall not depend on querying the Host PC database or any other controller or system component for code authorizations.

x. All communication between the Host PC & Master controller (Direct, Dial-up or TCP/IP), and between the Master & Slave controllers use a polled communication protocol that checksum and acknowledges (ACK) each message. All communication is verified and will automatically be buffered and retransmitted if it fails to be acknowledged.

xi. There shall be NO degradation of System performance

in the event of a communication loss between the Host PC and the Master controller. The Master controller shall automatically switch to buffer mode storing up to 10,000 events. There shall be NO loss of transactions in System history files until the controller buffer overflows.

xii. A missing or failed controller shall not degrade the performance of the communicating controllers in the controller communication network. Missing controllers shall be ignored and sampled less often by the Master controller. Any functioning Slave controller not communicating with the Master will automatically switch to buffer mode storing up to 10,000 events.

xiii. Buffered events shall be handled in a FIFO (First in First Out) mode of operation.

xiv. All controllers shall have a built in dead man reset timer (watchdog circuit) that automatically reboots the controller in the event the processor is interrupted for any reason.

xv. Any controller that is reset, or powered up form a non-powered state shall automatically request a parameter download and reboot to its proper working state. This shall happen with out any operator intervention.

xvi. The System shall provide a means for viewing the Communications Status of the intelligent controllers RS485 Communications loop.

xvii. The Communication Status window shall display which controllers are currently communicating, a total count of missed polls since midnight, and which intelligent controller last missed a poll. Missed polls reflect that messages had to be retransmitted and are an indication to the soundness or quality of the controller-to-controller network.

xviii. The Communication Status window shall show what type of CPU, what type of Input/Output board, and how much RAM Memory each controller has.

xix. The chance that a controller will allow access to an unauthorized individual under normal operating conditions shall be less than 1 in 10,000.

xx. The chance that an authorized individual will be denied access under normal operating conditions shall be less than 1 in 1,000.

b. PC to Controller Communications (All Types)

i. The System shall communicate using Serial ports for direct connections, and/or TCP/IP LAN and/or dial-up Modems for connections to locations.

ii. The System shall be able to use either one or both serial ports for dial-up modems, and either one or both serial ports for direct connect locations and/or TCP/IP LAN connect locations.

iii. The serial ports used for communications shall be

individually configurable for Direct Communications, Modem Communications Incoming & Outgoing, or Modem Communications Incoming only, or as an ASCII output port.

iv. If more than 2 serial ports are needed, a Windows compatible Multi-Port Communications Board shall be used.
- The outboard multi-port serial board shall connect to an internal PCI bus adapter card. The port expander boards shall have an expandable and modular design. The port expansion modules shall be available in a 4, 8, or 16 Serial Port Configuration that is expandable to 32 or 64 serial ports.
- The Multi-Port Comm Board shall allow multiple direct connect Masters to be connected to the System.
- The Multi-Port Comm Board shall allow multiple dial-up modems to be connected to the System.

v. Direct serial, TCP/IP and Dial-up Modem Communications shall have no difference in monitoring or control of the System with the exception of the connection that must first be made to a dial-up location.

vi. For TCP/IP communications an option to set the Poll Frequency and Message Response Time Out settings shall be available. This will allow tuning for bandwidth and latency issues associated with network communications.

c. Direct Serial or TCP/IP PC to Controller Communications C.
   i. The communication software on the PC shall supervise the Controller to PC Communications link.
   ii. The communications shall be supervised when using either direct serial port connections, or TCP/IP LAN connections.
   iii. Loss of communications to any Master Controller shall result in a Communication loss alarm at all PCs running the communications software. The Master controller shall then automatically buffer events.
   iv. When communications is restored to the Master Controller all buffered events shall automatically upload to the PC and any database changes shall automatically be sent to the Master controller.

d. Dial-up Modem PC to Controller Communications
   i. The communication software on the PC shall supervise the Controller to PC Communications link during dial-up modem connect times.
   ii. The System shall be programmable to routinely poll each of the remote dial-up modem locations collecting event logs and verifying phone lines each at different

time intervals.

iii. The System shall be programmable to dial and connect to all dial-up modem locations and retrieve the accrued history transactions on an automatic basis as often as once every 10 minutes to once every 9999 minutes.

iv. Failure to Communicate to a dial-up location 3 times in a row shall result in an alarm at the PC.

v. Time offset capabilities shall be present so that locations in a different geographical time zone than the Host PC will be set to and maintained at the proper local time. This feature shall allow for geographical time zones that are ahead or behind the host PC.

vi. The Master of a dial-up modem-connected location shall automatically buffer all normal transactions until it's buffer reaches 80% of capacity. When the transaction buffer reaches 80% the Master controller shall automatically initiate a phone call to the central monitoring PC and upload all transactions.

vii. If an alarm event occurs, the Master controller shall initiate an immediate call to the PC to report the alarm event.

viii. Modem Communications shall allow the use of 9600-baud dial-up modems provided by the manufacture of the System. Modems used at the Master Controller shall be powered and battery backed up by the controller.

e. Controller to Controller Communications

i. The Controller to Controller Communications shall be a true RS-485, 4-wire, point to point, regenerative (repeater) communications network methodology.

ii. The RS-485 communications signal shall be re-generated at each controller without any additional modules or hardware.

iii. The controller-to-controller communications shall be performed without the use of external modules or devices.

iv. The Master Controller shall supervise the communications to each Slave controller. Communication Loss shall be reported immediately for direct serial port connected locations. Controller communications loss shall be configurable to initiate a call to the PC for dial-up modem locations

f. Database Downloads

i. Controllers shall initially be downloaded with all Location data.

ii. The System shall download all database changes to the intelligent controllers utilizing automatic non-invasive incremental updates also known as the Downloading of Changes Only.

iii. When data is downloaded from the PC to the Master controller the PC shall request a complete database checksum to check the integrity of the download. If the

data checksum does not match the PC, the full data download shall automatically be retransmitted to the Master controller.

iv. When data is downloaded from the Master controller to a Slave controller the Master controller shall request a complete database checksum to check the integrity of the download. If the data checksum does not match the Master, the full data download shall automatically be retransmitted to the Slave controller.

v. When data is transferred from the Master controller to the Slave controllers the integrity of the data download is verified through checksums. A check sum on each message, each table, and a final table total checksum are calculated. If the checksums do not match the Masters the data shall be automatically retransmitted from the Master to Slave.

vi. If the Master controller is reset for any reason, it shall automatically request a database parameter download from the PC. When the Master is a dial-up modem connect location, it shall automatically dial the PC, and request and receive the database parameter download. The download shall restore the remote site to its normal working state and shall take place with no operator intervention.

vii. Slave controllers that have lost communication with the Master controller upon restoral shall have their database evaluated by the Master Controller. If the controllers' database is still current the controller is brought back on-line without downloading. If the controllers' database is not current it is brought back on-line and then fully downloaded. This download shall restore the Slave controller to its normal working state and shall take place with no operator intervention.

viii. When changes are made to the database for a dial-up modem location the PC shall automatically call and download those changes to that location. No operator commands shall be necessary.

ix. The System shall have the ability to schedule the download of changed data to a dial-up location (for lower phone rates) between the hours of 2 and 5 AM.

x. The System shall also allow the data changes to be downloaded immediately or after a programmable delay from 1-999 minutes (prevents system from multiple sequential phone calls when editing a dial-up locations' data).

g. Alarm Response and Handling

i. The System shall have manual and automatic responses to incoming point status change or alarms.

ii. Each input shall have the ability to respond automatically with a link to inputs and or outputs, operator response plans, unique sound with the use of

WAV files, maps or images that graphically represent the point location.

iii. Maps shall automatically display for each input assigned to it that has gone into alarm if the option is selected on a per input basis.

iv. Alarm handling shall require a two-step process. When the alarm is first responded to it will be referred to as Acknowledged. This shall silence alarm beeping and any alarm WAV files being played. The alarm is then referred to as acknowledged but Un-Resolved. The next handling of the alarm will give the operator the ability to give a resolution (or operator comment) as to the final deposition of the event. The alarm shall then clear.

v. Each workstation shall display the total pending alarms and total un-resolved alarms.

vi. Each alarm point shall be programmable to disallow the resolution of alarms until the alarm point has returned to its normal state.

vii. Alarms shall be reported in a real time fashion barring any connection time for non-direct connect (dial-up) locations to the Host PC where the operator shall be alerted and given an optional response plan or Action Message.

viii. Operator response action messages shall be a minimum of 65,000 characters each with up to 32,000 messages.

ix. Alarms shall be displayed and can be handled from a minimum of 4 different windows.

- The input status window: The status Icon will be overlaid with a large red blinking Icon. Selecting the Icon will acknowledge the alarm.
- The History log transaction window: The name, time, and date will display in red text. Selecting the red text will acknowledge the alarm.
- The Alarm log transaction window: The name, time, and date will display in red verbose. Selecting the red text will acknowledge the alarm.
- The graphic map display: The Icon for the input in alarm will Flash with a large red blinking Icon. Selecting the Icon will acknowledge the alarm

x. Once the operator has acknowledged the alarm, they shall be automatically prompted to enter comments as to the nature of, and action taken on the alarm. The operator comments may be manually entered or selected from a predefined list or a combination of both.

xi. Predefined Operator Comments shall have the ability to be used to resolve alarms where there are regular alarm occurrences. The operator shall have the means to choose from a list instead of typing the same message

repeatedly.

xii. The System shall track when and who acknowledged and resolved the alarm.

xiii. All identical alarms (from the same alarm point) shall be acknowledged at the same time the operator acknowledges the first one. All identical alarms shall be resolved when the first alarm is resolved. Restoral conditions, if set to be acknowledged shall follow the same operation as just described above for alarms.

xiv. The user shall have the ability to manually command inputs to arm, bypass, or follow their Time Zone from the PC with a one step command.

xv. The System shall have an alarm popup message window and beep that informs the operator of an alarm that is pending. This shall occur even when the alarm monitoring application is not the top window.

xvi. The alarm popup message window shall display the alarm and precisely identify the point.

xvii. The popup alarm window shall also provide the operator the opportunity to ignore the alarm and clear the popup window or to jump to the alarm-handling window and deal with the alarm and any subsequent alarms.

xviii. Alarm Messages shall be receivable by the PC even when the PC is downloading or retrieving a Log from the location Master.

xix. The System shall have the ability to acknowledge and resolve alarms and control inputs and outputs during a download and Log retrieval.

xx. When a reader-controlled output (relay) is opened the corresponding alarm point will automatically be bypassed.

xxi. All alarm points located on System controllers, with the exception of the 1043, shall accommodate 2, 3, and 4-state point monitoring with trouble conditions.

xxii. All inputs, with the exception of the 1043 shall be individually programmable with at least 5 different circuit types to choose from.

h. Input and Output Control

i. All inputs in the System shall have two Icons representations, one for the normal state and one for the abnormal state.

ii. When viewing and controlling inputs the Icons shall respond by changing and updating to the proper Icon to display that input's current state in real time. These Icons shall also display the inputs armed or bypassed state, and whether the input is in the armed or bypassed state due to a time zone or by a manual command.

iii. All outputs in the System shall have two Icon representations, one for the secure (locked) state and one for the open (unlocked) state.

iv. When viewing and controlling outputs the Icons shall respond by changing and updating to the proper Icon for that points current state in real time. These Icons shall also display the whether the output is in the secured or open state due to a time zone or by a manual command.

v. Animation: The Icons used to display status of the Input or Output points shall be constantly updated without any prompting by the operator to show their current real time condition.

vi. The operator shall be able to scroll the list of Inputs or Outputs and press the appropriate button on toolbar or right click to perform the desired function: arm, bypass or set to time zone for inputs, and secure, open, or set to time zone for outputs.

vii. Graphic Maps containing Inputs, Outputs and Override groups:
- Full color Maps shall be importable from most any graphics file format. Maps shall allow for all input, output, and override group Icons to be placed on the maps in an easy one step drag and drop method.
- Maps shall provide real-time display animation and allow for control of all points assigned to it.
- The System shall allow the same inputs, outputs, and override groups to be defined on different maps. There shall also be the ability to navigate from one map to the next that the points are defined on. There shall also reside the ability to order or prioritize the order in which the Maps will be displayed.

viii. Override Groups containing Inputs and Outputs:
- The System shall incorporate override groups that provide the operator with the status and control over user defined "sets" of inputs and outputs with a single Icon.
- The Icon shall change automatically to show the live summary status of all points in that group.
- The Override Group Icon shall provide a method to manually control or set to time zone all points in the group.
- The Override Group Icon shall allow the expanding of the group to show the Icons representing the live status for each point in the group, individual control over each point and the ability to compress the individual Icons back into one summary Icon.

ix. Schedule Overrides of Inputs, Outputs and Override Groups:
- To accommodate temporary schedule changes that do not fall within the holiday parameters

the system shall incorporate scheduled overrides individually for each input, output, and override group in the System.
- Each schedule shall be comprised of a minimum of two dates with separate times for each date.
- The first time and date shall be assigned the Override State the point shall advance to, when the time and date become current.
- The second time and date shall be assigned the state in which the point shall return to, when that time and date becomes current.

i. I/O Linking
   i. The System shall support I/O Linking, which is an action initiated by an input, output, or card read that causes a reaction within a group of inputs and/or outputs. Linking to an input controls its armed state. Linking to an output controls its on/off state.
   ii. In regard to the before mentioned Linking characteristics the System shall fully facilitate Input to Input Linking, Input to Output Linking, Output to Output Linking, Output to Input Linking, Code to Input, and Code to Output Linking.
   iii. All Input, Output, and Code Linking shall operate on a global level within a location. Global linking is any input, output, or card read use can initiate a link from any controller in the Location to any inputs and/or outputs on any controller(s) within the same location without any interaction with the host PC.
   iv. The System shall provide Linking initiated by an input hange of state or an input alarm.
   v. The System shall provide Linking initiated by the transition of an output from secure to open and the transition from open to secure.
   vi. Code to input and/or output linking shall be initiated by a designated code use at a designated reader/keypad.
   vii. The reader/keypad used will determine which group of inputs and/or outputs will be activated. That is the same card can cause a different link to occur based on which reader the card was read at.
   viii. Responses to links shall include: follow, latch, pulse, toggle, and return to time zone.

j. LAN Installations
   i. The Local Area Network shall allow multi-user capabilities to the system. It shall allow all functions to be executed at every Workstation on the LAN running the WinDSX software.
   ii. The software, running on a LAN, shall support as few as 2 Workstations or as many as 99.
   iii. The System software shall be Local Area Network (LAN) compatible without any software supplements or

upgrades.

iv. The system shall be compatible with Windows NT 4.0 Service Pack 6 or Windows 2000/XP Professional.

v. The system shall utilize TCP/IP as the primary protocol.

vi. The software shall be installed on the local hard disk of each Workstation so that each Workstation shall run the executable files of the program from the local hard disk, but reference the shared database on the File Server.

vii. One PC shall be designated as the Comm Server. This PC shall have the actual physical connection to the Intelligent Controllers by way of Direct Serial Port Connection, Dial-Up Phone Modem, or TCP/IP.

viii. All Workstations shall have full control capabilities over the controllers. They shall be able to perform all administrative duties such as Reports and Database Management, and interact with a local or remote site as operator password privileges allow.

8. **Data Base and System Feature Specifications**

a. Database Operation

i. The System data management program general layout shall be in a hierarchical menu tree format with simple navigation through expandable menu branches and manipulated with the use of menus and Icons in a main menu and System toolbar.

ii. The System shall use standard Icons in the toolbar for Add, Delete, Copy, Print, Capture Image, Activate, Deactivate, and Who-Is-In (Muster) report.

iii. The System shall be programmable with English prompts, scrollable menus, and pull down windows.

iv. All data entry shall automatically be checked for duplicate and illegal data. This field verification shall be used to insure that proper information is entered into the System.

v. The Database Management Program shall provide a Point and Click approach to data manipulation.

vi. Upon making a selection in database, the view window shall immediately display a list of records for the selected topic. From the view window Add, Edit, or Delete commands may be selected. The process of adding, editing or deleting will then return operator to the View Mode giving immediate visual feedback to all the program entries, existing or those just changed.

vii. There shall be a memo or note field for each item that is stored in the data. These note fields are useful for storing information about any defining characteristics of the item. These could be but are not limited to; the location of, what purpose item was entered for, or reasons changes were made.

xviii. There shall be a next and previous command buttons

visible when editing any database field for quickly navigating from one record to the next.

ix. There shall be a copy command and copy tool in the tool bar to copy data from one record for the purpose of creating a new similar record.

x. The system shall check all database entries for valid data and shall automatically display an error describing any invalid data.

b. File Management

i. The operator shall be able to backup the System data at any time and may define that backups be performed unattended.

ii. The Backup program shall be an integral part of the access control software. The backup System shall be easy to use with menu guidance.

iii. The System shall incorporate an Integral Database Backup and Restoration System with selectable target media including 3.5@ disk, Zip drives, and network resources as a minimum.

iv. The System Backup feature shall have both a Manual and Automatic mode of operation.

v. The System shall incorporate a Manual and Auto-Backup History feature that allows history to be backed up to a specified target and storage media including 3.5@ disk, Zip drives, and network resources as a minimum.

vi. The System shall incorporate database restoration features that allow data to be selectively restored.

vii. The backup program shall provide manual operation from any PC on the LAN and shall operate while the system remains operational.

c. Operator Passwords

i. The software shall support up to 32,000 individual operators each with a unique password.

ii. Each password shall be from 1 to 8 alphanumeric characters.

iii. Passwords shall be capable of being case sensitive.

iv. The password shall be hidden and never displayed when entered.

v. Each password shall accept a unique and customizable password profile with the ability for several operators to share a password profile.

vi. There shall be 32,000 definable operator password profiles.

vii. One password profile shall be predetermined for access to all functions and areas of the program.

viii. Each password profile may be customized to allow or disallow operator access to any program operation.

ix. All software functions shall have the ability to restrict operators through setting in a password profile.

x. All database functions such as View, Add, Edit, and

Delete shall have the ability to restrict operators by settings in a password profile.

xi. Password restriction shall apply to each input and output individually. This restriction specifies which inputs and outputs the operator is able to manually manipulate.

xii. Password shall be able to restrict which doors an operator can assign access to.

xiii. Operators shall use a User Name and Password to log on the System.

xiv. The same User Name and Password is used to access all areas and all programs.

xv. Once logged on, only those menu items and functions that the operator is authorized for based on the operator's password profile are displayed.

xvi. There shall be an Icon that allows the operator to log off without fully exiting the program. User may be logged off but the program will remain running. The logon window shall then be displayed for the next operator.

d. Hardware Location Password

i. There shall be a location password that will be utilized for PC to Dial-up Modem sites to prevent unauthorized communications with the location.

ii. Each location password shall be from 1 to 8 alphanumeric characters.

- The Location Password shall be verified with the dial-up location Master controller.

e. Reports and History

i. All history shall be initially stored on the hard disk of the host PC.

ii. The system shall have the ability to view the History on any workstation or print History to any system printer.

iii. All History Reports shall allow the user to select any date, time, event type, device, output, input, operator, location, name, or cardholders to be included or excluded from the report.

iv. The report shall be definable by a range of dates and times with the ability to have a daily start and stop time over a given date range.

v. Each report shall depict the date, time, event type, event description, device, or input/output name, cardholder company assignment, and the cardholder name or code number.

vi. Each line of a printed report shall be numbered to insure that the integrity of the report has not been compromised.

vii. The total number of lines of the report shall be given at the end of the report. If the report is run for a single event such as "Alarms" the total shall reflect how many alarms occurred during that period.

viii. All reports shall have the 3 following options:
- View on Screen.
- Print to System Printer.
- Save to File with full path statement.

ix. The System shall have the ability to produce a report indicating either:
- The status of the Systems inputs and outputs.
- The inputs and outputs that are abnormal, out of time zone, manually overridden, not reporting, or in alarm.

x. The System shall facilitate a Custom Code List Engine which allows the Access Codes of the System to be sorted and printed according to the following criteria:
- Active, Inactive, or Future Activate or De-activate
- Code number, Name, or Imprinted Card Number
- Company, Location, Access Levels
- Start and Stop Code Range
- Codes that have not been used since X number of days
- In, Out, or Either status
- Codes with Trace Designation

xi. The System shall incorporate a Who Is In (Muster) report; One Button Report for cardholder locating. This report shall contain a count of all persons that are "In", location wide, and a count with detailed listing of name, date and time of last use, grouped by the last reader used or by the company assignment. This report shall also be generated from a pre-defined alarm input. Any Workstation in the system shall be able to print the report for a particular location.

xii. The reports of the systems database shall allow options such that every data field may be printed.

xiii. The reports of the systems database shall be constructed such that the actual position of the printed data shall closely match the position of the data on the data entry windows.

f. Graphics

i. The software shall support 32,000 Graphic Display Maps. The system shall allow the maps to be imported from a minimum of 21 standard formats from another draw or graphics program including AutoCAD TM.

ii. All Inputs and Outputs shall have the ability to be placed on any graphic map in a drag and drop method.

iii. Graphic maps shall display automatically the real time state of outputs and inputs in an animated fashion.

iv. Camera Icons shall have the ability to be placed on any graphic map that when selected will open a live video window and display the camera associated with that Icon and provide for real time Pan, Tilt, Zoom control.

v. Any Input, Output or Camera placed on a map shall allow the ability to Arm or Bypass an input, Open or Secure an output, or control the Pan, Tilt, Zoom function of any camera.

vi. Any alarm input activation shall optionally by input automatically pull up a graphic map associated with the alarm.

vii. Any alarm activation shall give the operator the ability to manually pull up a graphic map associated with the alarm.

viii. The operator shall be able to view the inputs or outputs and the point's name by simply moving the mouse cursor over the point on any graphic map.

ix. All inputs and outputs may be placed on multiple graphic maps. The operator shall be able to toggle to view all Graphic Maps associated with any input or output.

x. Each graphic map shall have a display order sequence number associated with it to provide a predetermined order when toggled to different views.

g. Help

i. All main menus shall have a Help option listed.

ii. The System Help selection shall provide a unique and descriptive context sensitive Help System for all selections and functions with the press of one function key.

iii. The Help System shall provide a manner of navigation to any specific topic from within the first Help window.

iv. The help system shall be accessible outside the program.

h. Access Card/Code Operation and Management

i. Access authorization shall support verification of the card/code by facility code (if implemented) first, by card/code and/or Pin validation second, by access level (time of day, day of week, date), by anti-passback status, and by number of uses.

ii. The System shall allow multiple cards/codes to be assigned to a cardholder.

iii. Each card/code assigned to a cardholder shall have the ability for an unlimited number of access levels assigned to it across all locations. Each access level shall have any combination of doors in it. Each door shall have the ability to have 4 time zones associated with it.

iv. The System shall allow the grouping of locations that allows cardholder data to be shared by all locations in the group, thus preventing the redundant data entry.

v. The System shall facilitate the viewing, building, editing and issuing of access levels from the code entry window, through an Access Level Manager Engine that maintains and coordinates all access levels to prevent duplication or the incorrect building of levels.

vi. The System shall allow a person to be entered into the System for visitor, data tracking or photo ID purposes without assigning that person a card or code.
vii. Key Tracking shall be an integral function of Cardholder data. This shall allow the tracking and accountability of lock hardware keys (metal keys) issued to each cardholder. Reports can be generated displaying all keys assigned to this cardholder or all cardholders that have a specific key.
viii. The System shall provide a special audible and visual annunciation at PC when a card/code selected to be traced is used at designated trace readers. In addition cardholder image shall be automatically displayed when a traced card is used at designated trace readers.
ix. The System shall allow each Card Holder to be given either an unlimited number of uses or a number range from 1-9998 that regulates the number of times the card can be used before it is automatically disabled.
x. The System shall allow cards/codes to be activated and de-activated manually or automatically by date as well as time. The System shall allow for multiple deactivate dates to be pre-programmed.
xi. The System shall have the ability to de-activate cards/codes by company based on lack of use for a pre-defined number of days.
xii. Integral Photo ID Badging and Photo Verification shall use the same database as the Access Control System and may query data from cardholder, company, and other personal information to build a custom ID badge.
xiii. Automatic or manual image recall and manual access based on photo verification shall also be a means of access verification and entry.
xiv. The System shall allow a means of grouping cardholders together by Company (department) or other characteristic for a more efficient method of reporting on and enabling/disabling cards/codes.
xv. The Access Codes may be up to 12 digits in length.

i. Facility Codes
   i. The System shall accommodate up to 2048 Facility Codes per location with the option of allowing the Facility Codes to work at all doors or just particular doors.

j. Operator Comments
   i. With the press of one appropriate button on toolbar the user shall be permitted to make Operator Comments into History at anytime.
   ii. Automatic prompting of Operator comment shall occur before the resolution of each alarm.
   iii. Operator Comments shall be recorded with time, date, and operator number.
   iv. Comments shall be sorted and viewed through Reports

and History.

v. The operator comments shall comprise of two parts and either or both may be utilized, predefined or manually entered.
   - Manually entered through keyboard data entry (typed) up to 65,000 characters per each alarm
   - Predefined and stored in the database for retrieval upon request.

vi. The system shall have a minimum of 999 Predefined Operator Comments with up to 30 characters per comment. The Operator Comments that can be manually entered shall accept up to 65,000 characters per Comment.

vii. Predefined Operator Comments shall have the ability to be used to resolve alarms where there are regular alarm occurrences. The operator shall have the means to choose from a list instead of typing the same message repeatedly.

k. Company

i. The System shall provide a means of assigning one of 32,000 company names to a group of cardholders.

ii. Company names may be used to separate cardholders into groups that allow the operator to determine the tenant, vendor, contractor, department, or division of a company the person belongs.

iii. The software shall have the ability to deactivate and re-activate all codes assigned to a particular company with one action.

iv. History reports and code list printouts shall have provisions to be sorted by Company name.

v. Company names shall provide a means to give managers reports that pertain to their personnel only.

l. Time Zones

i. The System shall allow up to 32,000 Time Zones for each of the 32,000 locations.

ii. Each Time Zone shall contain a start and stop time for 7 the days of the week and 3 separate holiday schedules.

iii. A Time Zone is assigned to inputs, outputs, or access levels to determine when an input shall automatically arm/disarm, when an output shall automatically open/secure, or when cards assigned to an access level shall be denied or granted access.

iv. Dynamically linked bar graphs shall display the resultant active and inactive times for each day and holiday as start and stop times are entered or edited.

v. The System shall allow for up to 4 different Time Zones to be assigned to any input, output.

m. Holidays

i. The System shall have provisions for 32,000 Holidays.

ii. Each Holiday shall be defined with MM/DD/YYYY and a description.

iii. Up to 32,000 holidays may be entered in advance.
iv. Holidays shall be defined as a minimum of three types. This will allow for 3 separate holiday schedules.
v. Holidays shall have an option to be designated as occurrence each year; those shall remain in system and not be purged.
vi. Holidays not designated to occur each year shall be automatically purged from the database after the date expires and a new Holiday is added.
vii. Each Holiday shall have the ability to be assigned to one of three types of Holiday. The type of holiday shall be relative to a time period of one twenty-four hour period.

n. Access Levels
i. The System shall allow for 32,000 access levels.
ii. One level shall be predefined as the Master Access Level. The Master Access Level shall work at all doors at all times and override any anti-passback.
iii. The System shall allow for access to be restricted to any area by reader and by time. Access Levels shall determine when and where a card is authorized.
iv. The System shall be able to create multiple door and time zone combinations under the same Access Level so that a card may be valid during different time periods at different readers even if the readers are on the same controller.
v. Each door in an access level shall have the ability to have a minimum of 4 different time zones assigned to it.
vi. The System shall incorporate an Access Level Manager Engine for menu guidance and assistance in creating, managing, and assigning access levels.
vii. The manager shall be accessible from the card data entry window.
viii. When assigning an Access Level, the access level manager engine shall provide door and time zone listings for the operator to choose from.
ix. The system shall allow the ability to copy form one door assignment up to 4 time zone schedules with one operation for assignment to another door. This shall reduce operator data entry time when creating access levels that use like time zone schedules.

o. User Defined Fields
i. The System shall provide a minimum of 99 User Defined Fields for specific information about each access code holder.
ii. User defined fields shall allow up to 50 characters per field.
iii. The title of each field shall be programmable up to 20 characters.
iv. There shall be a "Required" option for each user

defined field that when selected forces the user to enter data in the user-defined field before the cardholder record can be saved.

v. There shall be a "Unique" option for each user defined field that when selected will not allow duplicate data from different cardholders to be entered.

vi. Each User defined field shall have data masking in its setup that will require the data to be entered with certain character types in specific spots in the field entry window. This shall facilitate data to have like formatting display.

vii. There shall be an option for each user defined field when selected will define the field as a deactivate date. The selection shall automatically cause the data mask to be formatted with the windows short date format. The system will order these fields and use the next future date of that order to set the deactivate date of that cardholder.

viii. There shall be an option to select one of the 99 user defined fields as the Name ID. Data from this type of user-defined field will appear on the same window as the cardholder data entry window.

ix. There shall be a search capability to allow any one user defined field or combination of user defined fields to be searched to find the appropriate cardholder.

x. String searches shall have the ability to be made on any field in conjunction with any other field searches.

xi. The System shall have the ability to print cardholders based on and organized by the Used Define Fields.

p. Code Tracing

i. The System shall perform Code Tracing selectable by cardholder and by reader.

ii. Any code may be designated as a Traced Code with no limit to how many codes can be traced.

iii. Any reader may be designated as a Trace Reader with no limit to which or how many readers can be used for Code Tracing.

iv. When a Traced Code is used at a Trace Reader the Access Granted Message that usually appears on the Monitor window shall be highlighted with a different color than regular messages.

v. A short singular beep shall occur at the same time the highlighted message is displayed on the window.

vi. The traced cardholder image (if image exists) shall appear on workstations when used at a trace reader.

9. **Application Specific Features**

a. RS-232 ASCII Interface Specifications

i. The ASCII Interface shall allow for RS-232 connections to be made between the Host PC/Comm Server and any equipment that will accept a RS-232 ASCII command strings such as CCTV switchers, intercoms

and paging systems.

ii. Each alarm input in the System shall allow for individual programming to output up to four unique ASCII character strings through two different Comm ports on the Host PC.

iii. Each input shall have the ability to be defined to transmit a unique ASCII string for Alarm and one for Restoral through one Comm port and a unique ASCII string for a non-alarm abnormal condition and one for a normal condition through the same or different Comm port.

iv. The predefined ASCII character strings shall have the ability to be up to 420 characters long with full use of all the ASCII control characters such as return or line feed. The character strings shall be defined in the database of the System and then assigned to the appropriate Inputs.

v. The Comm ports of the Host PC/Comm Server used to interface with external equipment shall be defined in the Setup portion of the software. The Comm port's baud rate, word length, stop bits, and parity shall be definable in the software to match that of the external equipment.

vi. This RS-232 output shall be capable of connection to a pager interface that can be used to call a paging system or service and send a signal to a portable pager. The system shall allow an individual alphanumeric message per alarm input to be sent to the paging system. This interface shall support both numeric and alphanumeric pagers.

vii. RS-232 used to transmit input alarms to central station automation software.

- The system shall be able to emulate the communications of a central station digital receiver to an alarm automation system. Thus allowing alarms that are received into the WinDSX system to be transferred to the alarm automation system just as if they were sent through a digital alarm receiver.
- The system shall be able to transmit an individual message from any alarm input to a burglar alarm automation monitoring system such as MAS or SIMMS.
- The system shall be able to append to each message a predefined set of character strings as a prefix and suffix.
- The system shall have the option of utilizing ACK and NAK messages from the automation system.
- The system shall have the ability to automatically clear alarms from its alarm queue

after it has successfully transmitted it to the automation software.

b. Floor Select Elevator Control Specifications
   i. The Elevator Control function shall be an integral part of the Access Control System.
   ii. The System shall be capable of providing full elevator security and control without any reliance on the Host PC for elevator control decisions.
   iii. The System shall enable and disable car calls on each floor and/or floor select buttons in each elevator cab, restricting passenger access to the floors where they have been given access.
   iv. The typical System shall utilize a card reader in each elevator cab.
   v. The System shall, through programming, automatically secure and open (unsecured) each floor select button of a cab individually by time and day. Each floor select button within a cab shall be separately controlled so that some floors may be secure while others remain open.
   vi. Once a floor select button is secure, it shall require the passenger to use their access code and have access to that floor before the floor select button will operate.
   vii. The passenger access code shall determine which car call and/or floor select buttons are to be enabled. This shall restrict the user from activating the floor select buttons corresponding to floors they not allowed access to.
   viii. The cardholder access shall be dynamic so that depending at which reader the access card is used determines which floor select buttons are enabled and shall prevent floor select buttons from being enabled in other elevator cabs.
   ix. The System shall enable the floor call buttons the cardholder has access to only in the cab where the cardholder used the card.
   x. The System shall have the ability to limit an individual's access to specific floors at specific times per floor.
   xi. If the elevator System is so equipped, it shall be possible to receive a contact closure from the elevator equipment to indicate which call button is pressed.
      - The contact closure shall connect to one of the alarm inputs on the Intelligent Controllers and could be used to record which call button the user pressed.
      - The input from the intelligent controller shall have the ability to be used to reset any additional call buttons that may have been enabled by the users access code. This shall prevent "Tag-Along or Tailgaters" from pressing a call button that someone else's code

enabled.

xii. The floor select elevator control shall allow for manual override either individually by floor or by cab as a group from a workstation PC.

xiii. The system shall be capable of utilizing spare conductors in existing travel cable to connect the cab card reader through special line conditioning modules.

c. After Hours HVAC Control Specifications

i. The HVAC control features shall control and record the after hours use of the heating and cooling system in zones or tenant space.

ii. This control shall give the administrator the ability to determine how much extra energy consumption each tenant is responsible for. This information can be used in billing tenants for the extra after hour usage.

iii. At the specified time every day, the HVAC shall automatically go into its after hours mode. It shall then revert into its normal business hours mode by a tenant using an access code or card at a designated keypad or reader.

iv. Once enabled, the tenant's HVAC zone shall be under thermostat control for a preset amount of time. When preset time elapses, the HVAC for that zone shall revert to back to its after hours mode unless a tenant uses their code or card again. This shall continue until the unit automatically returns to it's normal business hours operation.

v. The System shall allow the HVAC system to be enabled after a valid access in any of three ways;
- A range of 1 sec to 546 minutes (9.1 hrs) OR
- Until the card or code is used again at the same or different reader/keypad.
- Until the system returns to its normal hours of operation.

vi. The HVAC control shall always allow for manual override from the PC.

vii. Each of the outputs that control the HVAC zones shall allow control from up to four different time zones. The time zones shall allow for automatic control, based on time of day and day of week, including 3 unique holiday schedules.

viii. The after hours HVAC control shall operate in conjunction with all other features running simultaneously and use the same PC that is controlling access for the building but shall not be reliant on the Host PC for any HVAC control decisions.

ix. After hours HVAC control shall allow a reader or keypad to be used at each tenant space or in a common area shared by multiple tenants.

d. Real Time Guard Tour Specifications

i. Guard Tour shall be an integral part of the System.

ii. A Tour Station is a physical location a guard shall reach and perform an action indicating that the guard has arrived. This action, performed at the tour station, shall be one of 13 different events with any combination of station types within the same tour. A tour station shall be one of the following event types: Access Granted, Access Denied Code, Access Denied Card plus PIN, Access Denied Time Zone, Access Denied Level, Access Denied Facility, Access Denied Code Timer, Access Denied Anti-Passback, Access Granted Passback Violation, Alarm, Restoral, Input Normal and Input Abnormal.

iii. Guard Tour shall allow proprietary (user controlled) direct connected Systems to make use of existing Access Control hardware to perform Guard Tour Management in a real time fashion.

iv. Guard Tour and other system features shall operate simultaneously with no affect on each other.

v. The Tours shall be initiated at the PC.

vi. Guard Tour shall allow the user to define specific routes or tours for the guard to take with time restrictions.

vii. All guard tour activity shall be automatically logged to the computers Hard Disk.

viii. The guard shall have a time window in which to reach every predefined Tour Station.

ix. The guard, in making rounds, shall check in at predetermined Tour Stations within the specified times, otherwise an alarm shall be generated at the PC.

x. If the guard is late to a Tour Station, a unique alarm per station shall appear at the PC that indicates which station the guard failed to check in at.

xi. If the guard is early to a station it shall be reported to the PC how early guard is.

xii. The System shall allow the tours to be executed sequentially or in a random order with an overall time limit set for the entire tour instead of individual times for each tour station.

xiii. An optional user defined response plan shall be displayed for the operator or guard at the PC to follow should a "Failed to Check-In" Alarm occur.

xiv. There shall be 999 possible Guard Tour definitions with each Tour having up to 99 Tour Stations. All 999 Tours can be running at the same time.

e. Photo Badging Specifications

i. Photo Imaging shall be an integral part of the Access Control System.

ii. The same software shall be configurable for Access Control only, Photo Badging only, or Access Control and Photo Badging.

iii. The Number of badges shall be limited only by Hard

Disk space.

iv. The System shall have a true WYSIWYG badge building operation.

v. The System shall print on Paper or directly on Card Stock.

vi. The Badge System shall operate in the Windows NT/2000/XP Professional Environment.

vii. The Badge System shall be LAN compatible.

viii. The Badge System shall be a video based and film-less identification System.

ix. The Badge System shall allow the user to issue access codes and at the same time generate an identification card, or badge, for temporary or permanent use.

x. The Badge System shall be a true Windows NT 32 bit application providing all of the advantages of the graphical user interface.

xi. The System shall have a print preview capability.

xii. The System shall have the ability to create different badge templates for each department, tenant, or contractor.

xiii. Templates shall be automatically selected for the card being printed based on the company or department the cardholder is assigned to.

xiv. The operator shall be able to override the automatic selection of the badge template and choose which template they want to use when creating a badge.

xv. Badge backgrounds shall be selectable along with any other graphic images to be placed on the template.

xvi. Any of the cardholder information in the access System such as Name, Code, Company, Access Level, and any of the 99 User Defined Fields shall be selectable with the ability to place them anywhere on the card.

xvii. The System shall have the ability to Ghost an image or graphic with varying degrees of transparency to be placed anywhere on the card.

xviii. The System shall support unlimited usage of the 99 User Definable Fields that allow any data to be recorded and/or printed on a photo id badge.

xix. The System shall include shapes that can be placed on the badge without having to use a draw program. The shapes shall utilize size and color capability of Windows NT

xx. Custom Text shall be able to be created in the imaging software, and placed anywhere on the card, utilizing full font, size and color capability of Windows.

xxi. Text shall be placed and optionally automatically centered within any region of the badge layout.

xxii. The System shall provide the ability to rotate to any degree text and barcodes on the printed badge.

xxiii. The System shall facilitate printing multiple Bar Codes in 3/9 and 2/5 formats with Security Blocks, directly on

the access card.

xxiv. The System shall also have provisions to encode Magnetic Stripe cards as they are being printed with full integration to the database that shall provide the number to be encoded.

xxv. The System shall have provisions to print on both sides of a direct print card with only 1 pass through the printer.

xxvi. The System shall have the ability to recognize a UDF field as an auto-incrementing card number. This will allow for each card to be printed with a unique number automatically generated by the software.

xxvii. The System shall allow Batch Card Printing as follows: The System shall allow the cardholders to be selected using the normal Windows conventions for selecting multiple records from a list. It shall then print the badges from the selected list of cardholders using the correct template for each one.

xxviii. The System shall have provisions to import captured images or photos using a digital camera. There shall be a quick and easy way to attach a secondary or digital camera to the System.

xxix. The System shall facilitate simultaneous connections to both a RGB output CCD Camera, and a digital camera.

xxx. The system shall support multiple images stored for each cardholder, including signatures, portrait views, profile views, etc.

xxxi. The System shall facilitate virtual Camera Pan and Tilt so that the camera does not have to be physically adjusted while capturing an image.

xxxii. The System shall allow for the importing of the cardholder picture from a file.

xxxiii. The System shall allow for an image in a standard format to be imported and a copy of it saved in the format the System requires.

xxxiv. The System shall accept live video from any device providing an MCI or TWAIN interface that is Windows NT/2000/XP Professional compatible.

xxxv. The System shall allow multiple images on the same badge to include but not be limited to: Barcodes, Digital Photos, and Signatures.

xxxvi. The System shall support transparent backgrounds so the either a captured image photo or signature, is only surrounded by the intended background but not its immediate background.

xxxvii. The System shall facilitate the manual editing and cropping of the stored images. The System shall also have the ability to automatically edit the image and provide multiple views of the same image that have different characteristics and changes applied to each one for the operator to choose from.

xxxviii. The System shall have the ability to encode a Magstripe card in ABA Format on track 1, 2 or 3 at the same time the card is being printed.

xxxix. The System shall be compatible with any Windows compatible direct card printer.

xl. The System shall have an auto image retrieval feature that allows cardholder information and pictures to be automatically displayed on a PC running the same software.

xli. The System shall support the automatic display of cardholder images on any or all selected readers when the cardholders use their card/code at the selected readers/keypads.

xlii. The System shall allow for a cardholder image to be recalled manually when the operator double clicks (selects) any access granted or denied event on the real time monitor window.

xliii. The System shall allow for automatic sizing of data fields placed on a badge to compensate for names that may otherwise be to large to fit in the area designated.

f. Visitor Assignment

i. The system shall have a means of allowing cardholders to be assigned with a visitor designation.

ii. The system shall allow Names to be added that may or may not be assigned codes.

iii. The system shall be able to restrict the access levels that may be assigned to cards that are issued to visitors.

iv. There shall be an option on access levels that will designate an access level as visitor assignable.

v. The system shall utilize an online log book that during enrollment of a visitor the operator will have access to a search engine that will produce a view all names in the query and by point and click method enter the name of whom is being visited.

vi. The system shall create an event for the history transaction as to the date time the visitor was added and to whom they were to visit.

vii. Once a visitor is enrolled in the system upon the next visit the system shall allow the operator to recall that visitors' cardholder file and by utilizing the search engine query, point and click on the name of the person being visited on this occasion. The system shall create a transaction with visitors name and whom they were to visit on that date.

viii. The system shall allow designation of any reader as one that deactivates the card after use at that reader, and logs to history as the return of the card.

ix. The system shall have the ability to utilize the visitor designation in searches and reports. Reports shall be able to print all or any visitor activity.

g. Time and Attendance

i. The System shall facilitate Time and Attendance using the access control hardware to gather the Clock IN and Clock OUT times of the users at designated readers.
ii. Reports shall show IN and OUT times for each day, total IN time for each day and a total IN time for period specified by the user.
iii. Reports shall have the ability to be viewed, printed, or saved to a file.
iv. Reports shall have the ability to alpha sort on the persons last name, by location or location group.
v. Reports shall include all cardholders or optionally the ability to select individual cardholders for the report.
vi. There shall be provisions for a real time display module (TDM) that is DC powered from the Access System Controller.
vii. This TDM shall have a 7 segment LED display that is visible from all viewing angles. The segments shall be at least 1 inch in height.
viii. This Time Display Module shall be synchronized from the Access System Controller no less than once a minute. The TDM shall connect to the Access System Controller with a standard 4 conductor shielded cable and operate at up to 500 feet from the controller.

h. Anti-Passback
i. The System shall have Global and Local Anti-Passback features by Location.
ii. Synchronization of card IN/OUT status shall be global among up to 64 controllers, and shall not be dependent on the Host PC to be on line for proper operation.
iii. The System shall support Hard Anti-Passback. Hard anti-passback shall be defined as once a cardholder is granted access through a reader with one type of designation (IN or OUT). The cardholder may not pass through that type of reader designation until the cardholder passes though a reader of opposite designation.
iv. The System shall support Soft Anti-Passback. Soft anti-passback shall be defined as should a violation of the proper IN/OUT sequence occur access shall be granted, but a unique alarm shall be transmitted to the Host PC reporting the cardholder and the door involved in the violation. A separate report may be run on this event.
v. The System shall support timed anti-passback. Timed anti-passback shall be defined as capabilities by a controller that shall prevent an access code from being used twice at the same device (door) within in a user defined amount of time.
vi. The Anti-Passback schemes shall be definable for each individual door.
vii. The Master Access Level shall override Anti-Passback.

viii. Anti-Passback override shall also be an option on a per card basis.
ix. The System shall have the ability to forgive (or reset) an individual cardholder or the entire cardholder population anti-passback status to a neutral status.
x. There shall be a minimum of four different zones of anti-passback that may be utilized within each location. Each reader shall be assignable to 1 or all 4 anti-passback zones.
xi. The four zones of anti-passback shall operate independently.

i. Live Video and Camera Control
  i. The system shall provide means of displaying in a separate window the live video from a CCTV source.
  ii. The display window shall have separate control buttons to represent Left, Right, Up, Down, Zoom In, Zoom Out, Scan and minimum of two custom command auxiliary controls.
  iii. The command structure shall be such that one command string shall be issued when the control button is pressed down and another command shall be sent when the button is released. There shall be an option to automatically repeat the pressed down command as long as the button is pressed.
  iv. An Icon shall represent each camera to be controlled. Standard mouse clicking shall open a window that will display the video. If the system is connected to a video switcher it shall automatically send a command through a Comm port to display the requested camera when the Icon is selected.
  v. The system shall provide a minimum of 7 Icons to represent different types of cameras. The ability to import custom Icons shall be provided.
  vi. The Icons shall be able to be placed on graphic maps to represent their physical location. Standard mouse clicking shall open the display window for selected camera.
  vii. Each camera shall provide the ability to display and control a specific output on the video display window. The Icon representing the output shall display its real time status and respond in an animated fashion to the data reported from the field controller.
  viii. Each Input and Output shall be definable as associated with a camera. Upon selecting an Input or an output the system shall provide a pop up option window that will allow the camera associated with the point to be displayed.
  ix. The alarm-handling window shall have a command button that will allow the display of the camera associated with the alarm point.
  x. The CCTV video shall be brought into a "Video

Capture Card" installed on the PC where video is desired.

xi. The system shall have a Next and Previous command buttons on the display window that when selected will allow the user to scroll through all cameras defined on a workstation.

xii. The system shall provide that the same camera may be defined several times but display a different controlled Icon. This shall be used when one camera can view several entrances and will facilitate the use of the Next, Previous buttons.

10. **Execution**

a. General Requirements

i. Install system components and appurtenances in accordance with the printed instructions.

ii. Provide all necessary interconnections, services, and adjustments required for a complete and operable system.

iii. Install control signal, communications, and data transmission line grounding as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

b. Field Quality Control

i. Testing:

- Supply a proposed acceptance test procedure.
- Testing of system shall be the sole responsibility of the Contractor.
- Communications tests:
  - Controllers to manager server.
  - Manager server to client.
  - Remote dial-up support.

ii. Inspection:

- Provide an on-sight, factory-trained technician to assist, advise or manage installing personnel.
- All final connections shall be made under the direct supervision of the Systems Integrator.

iii. Field Service:

- Provide first line support for both the hardware and software properties of the selected system.
- Provided second line support directly from the manufacturer for all component and computer hardware and all operating and application software that comprise the complete system.
- Determine and report all problems to the manufacturer's customer service departments.
- Support shall be available to the integrator via the following methods:
  - Phone inquiries.
  - Direct dial-in to the customer system for remote system troubleshooting by a qualified Field Service Engineer.

- On-site visits if required, upon approval by the manufacturer's Customer Service Manager.

c. On Site Commissioning and Training
   i. The installing company shall provide direct participation in the on-site commissioning activity of new systems. Not less than 16 hours of on-site training shall be provided for a maximum of 6 representatives of Owner.
   ii. Provide systems administrator that is factory trained with the expertise on installing, configuring and commissioning the system to the customer's specific requirements; and to provide on-site training on system operation and administration.
   iii. On-site shall be available for system administrators, Operators and other qualified personnel.
   iv. On site commissioning shall include:
      - Hardware set-up and test.
      - Preventative maintenance and troubleshooting training.
      - End-user training.
      - Database configuration and build assistance.

d. Final Acceptance
   i. Perform the following performance standards before final acceptance:
      - Operate all mechanical devices without down time for a period of 10 days.
      - Operate all electronic devices and equipment without downtime or programming problems for a period of 30 days.
      - Upon completion of system testing and before the acceptance cycle, provide 2 copies of system manual to Owner.

11. For each DGP location, provide one spare card reader input point and 20 percent spare alarm input points and output points after all specified points are initially connected. A "DGP location" shall be defined as any remote location where alarm input devices, control output devices or access control devices are connected to the SMS. Sufficient plug in modules shall be provided to accommodate the number of card readers initially installed, and one spare input as specified.
12. A locking steel enclosure designed for surface mounting. All DGPs shall be keyed alike and shall be on the same key as all security system power supplies and power distribution cabinets. Provide any conduit required from the DGP to power supplies, junction boxes or wireways.
13. A wiring chart delineating wire routings, labeling, and all termination points. The chart shall be produced by the Contractor, laminated and housed in a clear plastic sleeve affixed to the inside of the enclosure cover.
14. A tamper switch to sense the removal or opening of the enclosure cover.
15. **Access Controlled Doors:**

a. Provide HID ProxPro / MiniProx / Thinline II card reader
b. Provide Detection Systems DS150 request-to-exit (REX) motion sensors for detecting authorized exits through card reader controlled doors. Wire the REX motion sensor to the REX input of the DGP. For doors equipped with electromagnetic locks, activation of the REX motion sensor shall release the electric locking mechanism and shall shunt the intrusion alarm output. For doors equipped with electric locking mechanisms that are free exiting at all times (i.e. mortise electric locks, electric strikes, etc.), the REX motion sensor shall only shunt the intrusion alarm output and shall not unlock the lock.

16. **Electric Locking Mechanisms**
    a. Electric locking mechanisms shall be provided by the door hardware supplier.
    b. Interface with electric locking mechanisms as indicated.
    c. Provide fail-safe operation of electric locking mechanisms as required by the local Authority Having Jurisdiction (AHJ) and applicable codes.
    d. Provide power supplies for all electric locking mechanisms (with the exception of electric panic hardware).
    e. Fail-secure locks shall remain operational during a fire alarm condition or power failure.
17. **Delayed Egress Locking Devices**
    a. The door hardware supplier shall provide delayed egress locking devices as indicated on the Security Drawings.
    b. Provide fail-safe operation of delayed egress locking devices as required by the local Authority Having Jurisdiction (AHJ) and applicable codes.
    c. Provide SMS monitoring of the normally closed alarm contact that shall open upon activation of the unlock timer.
    d. Provide lock control of delayed egress locking device through output contacts activated by file server / system workstation, or time schedule.
18. **Power Supplies** shall be Altronix unless otherwise specified.
    a. Provide all required power supplies. Power supplies shall be monitored to report primary input power failure, low battery condition and cabinet tamper on the SMS.
    b. Power supplies shall be housed in lockable cabinets and shall include a tamper switch to sense the removal or opening of the enclosure cover. All power supply/distribution cabinets shall be keyed alike and shall be on the same key as all security system DGPs.
    c. Power supplies shall be hard wired to the primary power source. Plug-in transformers or plug strips are not acceptable.
    d. Provide power supplies for all SMS equipment and electric locking mechanisms as specified.
    e. The DGP power supply shall be as recommended by DGP manufacturer. The DGP power supply is to be dedicated to DGP(s) and shall not provide power for locks or any other low voltage device.

i. Each DGP power supply shall be housed in a locking steel enclosure designed for surface mounting. Provide any conduit required from the DGP Power Supply to the associated DGP, junction boxes or wireways.

f. Provide battery chargers and batteries for all power supplies except those for fail-safe locks. Provide four (4) hours of battery backup.

19. **Door Position Switches**
    a. Provide Sentrol 1076 concealed, normally closed, magnetic door position switch and Sentrol 2200 Series overhead door position switch to monitor the open/closed status of doors.
20. **Tamper Switches**
    a. Provide normally Ademco closed tamper switches to monitor the secure status of all DGPs, power supplies, and power distribution units.
    b. Include the number of tamper switches in the total alarm input figures.
21. **Personnel Duress Alarms**
    a. Provide Ademco model 269 desk mounted personnel duress alarms with normally closed alarm output contacts.
    b. Locate desk mounted duress buttons below counter tops or in the knee space of desks in an accessible location. Verify the exact location with the Owner.
22. **Exit Alarm Units**
    a. Provide DSI -ES420 Series exit alarm(s) for local and remote monitoring of the secure status of doors as indicated on the Security Device Drawings.
    b. The exit alarm(s) shall provide for supervised monitoring of the door position switch(es) for the associated door(s).
    c. A horn within the exit alarm(s) shall sound and a normally closed alarm output contact from the exit alarm(s) shall be activated immediately whenever a protected door is opened.
    d. An integral keyswitch shall provide for activation of an authorized bypass timer, which shall allow the door to be opened for up to 15 seconds without initiating an alarm condition. The key cylinder shall be provided by the door hardware supplier and shall be keyed to the Owner's master key system. Coordinate with the Architect as required to ensure proper keying of all exit alarm(s).
    e. Provide remote bypass keyswitches as indicated on the Security Device Drawings (as applicable) for activation of the authorized bypass timer from the side of the door opposite the exit alarm(s). The remote keyswitch shall provide the same functions as the integral keyswitch. The key cylinder shall be provided by the door hardware supplier and shall be keyed to the Owner's master key system.
    f. The exit alarm(s) shall have a user selectable automatic reset that shall reset the horn and alarm output contact up to one minute after activation of the alarm.
    g. Provide for remote reset and deactivation of the EA through control output contacts activated manually by the SMS file

server / system workstation keyboard and SMS time schedule.

h. The EA shall have a tamper switch that shall immediately activate the output alarm contact upon removal of the EA from the wall.

i. Refer to the Security Device Drawings for EA wiring and connection requirements.

23. **Door Management Alarm**

a. Provide DSI -ES420 Series door management alarm(s) for local and remote monitoring of the secure status of doors.

b. The door management alarm(s) shall provide for supervised monitoring of the door position switch(es) for the associated door(s).

c. A horn within the door management alarm(s) shall sound and a normally closed alarm output contact from the door management alarm(s) shall be activated whenever a protected door is held open beyond a user adjustable time (0 to 60 seconds). Coordinate the initial time adjustment with the Owner and set as instructed.

d. The local alarm shall have a user selectable automatic reset that shall reset the horn and alarm output contact up to one minute after activation of the alarm.

e. Provide for remote reset and deactivation of the door management alarm(s) through control output contacts activated manually by the file server / system workstation keyboard and SMS time schedule.

f. The local alarm shall have a tamper switch that shall immediately activate the output alarm contact upon removal of the local alarm from the wall.

g. Certain doors shall be equipped with a door management alarm(s) and a card reader. Upon a valid card read by the associated card reader, or activation of the egress motion sensor, the SMS shall activate the local alarm shunt timer to allow the door to be opened without initiating an alarm condition. If the door is held open beyond the user selectable time, the unit will initiate a warning tone. If the door is not closed after the warning tone is generated the unit shall then activate an alarm tone and a normally closed alarm output. If the door is forced opened the door management alarm(s) will immediately sound a horn and activate a normally closed alarm output.

24. **Fiber Optic Transition System (FOTS)**

a. Provide all necessary equipment and cabling to provide a complete fiber optic communication link between the security equipment and the new SOC head-end equipment, using Owner provided fiber optic cable, including, but not limited to, fiber optic transition equipment and factory made fiber optic jumpers.

b. The fiber optic cabling dedicated for security video and data transmission shall transmit signals from fiber optic transmitters to fiber optic receivers.

c. Provide FOTS equipment as necessary and as specified herein,

including all cable, connections and miscellaneous hardware required to the fiber optic transition devices for a complete installation, including power supplies with four (4) hours of battery backup.

d. Video and data FOTS equipment shall be specifically designed for CCTV and control data transmission applications.

e. There shall be no visible degradation of video, control data and data signals over fiber optic transitions.

f. The Contractor shall be responsible for providing all patch cables, terminations, transition devices and installation of hardware required for a complete fiber optic cable system as necessary.

## 3. Execution

A. **Installation:**

1. All UTSA projects have a critical scheduling path, which must be closely followed in order to meet the completion date. Contractor shall be prepared to staff his work force according to the schedule constraints.
2. Aesthetics are an important consideration at UTSA. All components shall be installed so as to have aesthetically pleasing results per UTSA. Actual locations of all visible components shall be coordinated in advance with the Owner's Architect.
3. Install, make fully operational and test the system as indicated on the Drawings and Specifications.
4. Any interfacing with other systems shall be Contractor's responsibility under this contract, and the details, both logical and physical, of such interfaces shall be reflected in both Submittals and As-Built drawings.
5. All necessary back-boxes, pull-boxes, connectors, supports, conduit, cable and wire shall be furnished and installed to provide a complete and reliable system. Exact location of all boxes, conduit and wiring runs shall be presented to the UTSA for approval in advance of any installation.
6. Where required and requested by the UTSA, provide 120-VAC, 60 Hz power from nearest electrical panel through a junction box, to the system device.
7. Where required, install conduit, cable and wire parallel and square with building lines, including raised floor areas. Conduit fill shall not exceed 40%.
8. Provide appropriate conductors for all security devices, per project specifications and schedules in plans.
9. Install all accessible components with tamper proof security fasteners.
10. Comply with the wire marking and panel labeling provisions stated in the project specifications.
11. Before commencing installation, confirm that the necessary electrical power and grounding provisions are available to meet the security system manufacturer's stated requirements.
12. Coordinate with doorframe installation and window wall installation for installing and pulling wire and cable at those locations.
13. Confirm that the locking hardware provisions for individual doors are consistent with the security design.

14. Do not apply any power to any remote panel until all of the manufacturer's grounding requirements are complete.
15. All equipment shall be mounted with sufficient clearance to meet all applicable codes and facilitate observation and testing. Securely hang and/or fasten with appropriate fittings to ensure positive grounding, free of ground loops, throughout the entire system. Units shall be installed parallel and square to building lines.
16. Quiet and vibration-free operation of all equipment is a requirement of this installation. Properly adjust, repair, balance or replace any equipment producing objectionable (in the judgment of UTSA) noise or vibration in any of the occupied areas of any building and provide additional brackets and bracing if necessary.
17. Installation shall comply with all prevailing Codes and Standards followed by UTSA. Where more than one code or regulation if applicable, the more stringent shall apply. Seismic bracing shall be installed on appropriate equipment where local codes require such installation.
18. Where new equipment is replacing old equipment, Contractor is responsible for removing the old equipment and doing whatever repair work is necessary to meet standards determined by UTSA.
19. Install Fire Stopping for all penetrations in slabs and fire walls to meet code at the completion of work and prior to final testing demonstration to UTSA.

B. **Workmanship:**
1. The installation shall be performed in a professional manner.
2. On a daily basis, clean up and deposit in appropriate containers all debris from work performed under the appropriate specification sections. Stack and organize all parts, tools and equipment when not being used.
3. Preparation, handling and installation shall be in accordance with the Manufacturer's written instructions and technical data appropriate to the product specified.
4. All work shall conform to the National Electrical Contractors Association "Standard of Installation" for general installation practice.
5. At the conclusion of the installation, all work areas, including all panel boxes, shall be vacuumed and cleaned to remove all debris and grease.

C. **System Testing:**
1. Shop Test: Prior to the delivery to the site for installation, shop assemble and test all devices. Fully test and demonstrate that each is a correctly working device.
2. Site Test: After the system has been installed, perform the appropriate tests in accordance with the project specifications as well as all tests recommended by the manufacturer(s).
3. The Final Acceptance Test shall demonstrate the installed and activated System's performance and compliance with System Specifications. However, before this testing can begin the following must have been received and reviewed by UTSA.
   a. System Operations and Maintenance Manuals
   b. System Test Reports
   c. As-Built Drawings

*Appendix E, Commonly*

# Overlooked Standards

## DIVISION 01
- Construction Code Compliance (2)(A)
- Oil-Filled Device Containment Requirements (2)(B)(3)
- Texas Asbestos Health Protection Rules (2)(B)(5)
- Project Record Drawings (10)(B)

## DIVISION 02
- Tree Protection (2)(F)(3)

## DIVISION 03
- Mud Slab (4)

## DIVISION 05
- Structural Steel Shop Painting (1)(F)

## DIVISION 07
- Preferred Low Slope Roof (6)

## DIVISION 08
- Door Security (7)(F)
- Door Hardware (8)
- Windows (10)

## DIVISION 09
- Paint (7)

## DIVISION 10
- Bulletin boards, Marker boards, Map rails (2)
- Toilet & Bath Accessories (7)
- Defibrillators & Cabinets (8)

## DIVISION 12
- Black-out Shades & Laser Curtains (4)

## DIVISION 13
- Roof Tie-off Points (2)

## DIVISION 14
- Elevators (1)

## DIVISION 21
- Fire Sprinkler System Flushing (1)(C)

## DIVISION 22
- Water sterilization/chlorination (1)(C)
- Water Softener System (1)(H)
- No Plumbing in Electronic Equipment Rooms (1)(J)
- Laboratory Gas (1)(S)

## DIVISION 23
- Crawlspace (3)(C)
- Pipe Cleaning & Painting (3)(D)
- No Mech. Piping in Electronic Equipment Rooms (4)(G)(2)
- Variable Speed Drives (5)

## DIVISION 25
- HVAC Control System (BAS)(1)

## DIVISION 26
- No Electrical Aluminum Components (1)(D)(2)
- Emergency Power (2)(I)
- Automatic Transfer Switch Specs (2)(I)(3)
- Electrical ID (3)
- Switchgear Remote Switching (6)(D)
- Exterior Lighting Levels (10)(D)&(E)
- Lightning Protection Systems (11)

## DIVISION 27
- OIT EIA-TIA Standards (1)(A)(6)
- Data/Comm Room to have no other equipment in it (1)(D)(2)
- Atomic Clock Systems (2)

## DIVISION 28

- Security Consultant Required (1)(B)
- Fiber Optic Networking Specs (2)(G)

## DIVISION 32

- Crosswalks with Silica Sand (1)(E)
- Parking Lot Striping Color Specs (3)(D)(4)
- Irrigation Proprietary Products & Materials (6)(B)
- Landscape Minimum Warranty (7)(G)(5)(e)
- Water Variance Requests (7)(G)(5)(e)(vii)
- Soil Amendments (7)(G)(5)

## DIVISION 33

- Manhole Cover Inscriptions/Numbering (1)(B)
- Natural Gas Hot Taps (3)(H)
- Manhole Testing (5)(F)

## APPENDIX B

- Following Room Numbering Conventions (2)
- Exterior Building Lettering Specs (2)(C)
- Floor Map Approval Necessary on Sign Types ST-I-07, -10, -11 & -11b *

## APPENDIX C

- No ¾" IT Conduit **
- Maximum of (4) CAT6 cables in 1" Conduit **

*Appendix F*

# Helpful Design Questions

The following questions have been generated as a tool for use during Institutional and Capital Project design plan reviews. The origin of these questions lies in various common construction issues and problems that have arisen over the past 6 years on UTSA campuses.

It is the intent that utilization of the below questions – along with Appendix E above – will help minimize project change orders and avoid repeated occurrence in subsequent projects.

1. *Do all equipment components (transformers, panels, switches, etc.) physically fit in their respective rooms or closets?*
2. *Do any pipes, conduits, ducts, wire, etc. pass through the MDF, IDF or security closets?*
3. *Is emergency lighting (quantity, location, backup, etc.) designed per Code?*
4. *Is the Giant Voice campus emergency notification/management system in the project? Has appropriate coordination with the fire alarm system been accomplished for this?*
5. *How is the irrigation controller system designed: single, multiple or master-slave?*
6. *Is the irrigation system designed in isolatable loop(s)?*
7. *Is there a clear flushing plan delineated for the fire sprinkler system?*
8. *Are there any electrical system components that are aluminum?*
9. *Is remote racking in the project for the switchgear?*
10. *Have fire hydrant quantities and locations been designed per Code and confirmed as adequate by the UTSA AHJ?*
11. *Are all electrical and mechanical yards placed inside chain-link fencing for security?*
12. *Have floor drains been designed in all rooms and closets with electrical equipment (including MDF & IDF closets)? Does the floor sloping negatively impact leveling necessary for equipment installation?*
13. *Has appropriate flashing been provided at all horizontal/vertical "shelf" conditions at the building exterior?*
14. *Have concrete aprons been provided at all new manholes (esp. in lawn areas)?*
15. *Is all millwork fully designed?*
16. *Are there provisions in the specifications to provide UTSA with documentation of all hydrostatic tests and pre-tests?*
17. *Is there a building waterproofing membrane in the project (i.e. peel-and-stick)?*
18. *Has overhead corridor clash-detection coordination been done at the design level?*
19. *Has water-resistant gypsum board been provided at or adjacent to all wet walls?*

20. *Has the project code consultant thoroughly reviewed plans, especially in regards to fire alarm devices (smoke detectors, heat detectors, strobes, etc.)?*
21. *Are all appropriate components connected to emergency power?*
22. *Has conditioned air been provided to building corridors?*
23. *Is there an alternative means for documentation sharing (submittals, RFIs, ASIs, etc.) outside of the Newforma system? UTSA has had highly negative experience with this means of information sharing and prefers either an ftp site or pdf emails.*
24. *Has the design team numbered rooms in accordance with the UTSA Standards Convention?*
25. *Have accommodations been made for the monitoring of the emergency generator and fire alarm system?*
26. *Does each MDF/IDF closet contain adequate switches to accommodate IT device drop counts?*
27. *Are exit signs provided per 2012 TAS (216.4.1)?*
28. *Have bicycle racks been provided on the project? Have they been coordinated with the existing campus style?*
29. *Is the exterior building identification letter location part of the design?*
30. *Any questionable item: is it code required or UTSA required?*

***End of***
**UTSA Design & Construction Standards**

**Top of Appendix** **Table of Contents**